
PROJECT MANUAL

**HS Chiller Replacement & HVAC Upgrades
SED# 50-02-01-06-0-016-037**

For

**North Rockland Central School District
65 Chapel Street
Garnerville, New York 10923**



140 Park Avenue
TEL 845-708-9200
E-mail info@shilale.com

New City, NY 10956
FAX 845-708-9222
Web www.shilale.com

**MSA File No. 43065
01-08-25**

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140 Park Avenue □ New City, New York 10956 □ Tel 845-708-9200 □ Fax 845-708-9222 □ E-mail info@shilale.com

February 15, 2024

Wendy Clark
NYS EDUCATION DEPARTMENT
360 Education Building Annex
Albany, NY 12234

Re: HS Chiller Replacement & HVAC Upgrade
SED No. 50-02-01-06-0-016-037

MSA Project No. 43065

Dear Ms. Clark,

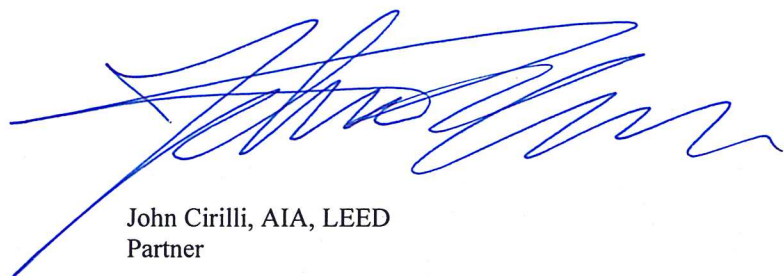
The undersigned certifies that to the best of his knowledge, information and belief, the plans and specifications are in accordance with the applicable requirements of the New York State Uniform Fire Prevention and Building Code, The State Energy Conservation Code and The Building Standards, of the New York State Education Department. I further certify that no new asbestos containing material will be specified to be used in construction, and that any ABCM will be treated in accordance with industrial code rule #56.

Work will involve known or suspected ACBM, and will be done in accordance with Industrial Code Rule #56. Testing result documentation on ACBM is shown in specification section 003126 Existing Hazardous Material Information. Work involving ACBM is detailed in specification section 020800 Asbestos Abatement Procedures.

If you require any additional assistance, please contact me at the office.

Sincerely,

MICHAEL SHILALE ARCHITECTS, LLP


John Cirilli, AIA, LEED
Partner

Cc: Michael Senno (NRCSD)
Michael R. Shilale, AIA, LEED, CPHC (MSA)



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NOTICE TO BIDDERS

The BOARD of Education of the North Rockland Central School District (in accordance with section 103 of Article 5-a of the General Municipal Law) hereby invites the submission of sealed bids on:

BID NO.	ITEM	DUE DATE
	HS Chiller Replacement & HVAC Upgrades	01-28-25

SEALED BIDS will be received until 2:00 P.M. in the office of facilities, on the date specified above, at the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923, at which time and place they will be publicly opened and read.

Bids will be received for contracts covering all work related to the HS Chiller Replacement & HVAC Upgrades for the North Rockland Central School District, as described in the plans and specifications.

A site inspection and pre-bidders' conference has been scheduled promptly at 3:30 PM on the 15TH day of January, at North Rockland High School 106, Hammond Road, Thiells, NY, 10984.

Complete digital sets of Bidding Documents, drawings, and specifications, may be obtained online as a download at the following website: msa.biddyhq.com under 'public projects.' Requests for information may be emailed to bidding@shilale.com.

Complete sets of Bidding Documents, Drawings and Specifications, may be obtained from Rev, 28 Church Street, Suite #7, Warwick, NY 10990 Tel: 845-651-3845, upon depositing the sum of \$100.00 for each combined set of documents. Checks or money orders shall be made payable to North Rockland Central School District. Plan deposit is refundable in accordance with the terms in the Instructions to Bidders to all submitting bids. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

All bid addenda will be transmitted to registered plan holders via email and will be available at msa.biddyhq.com. Plan holders who have paid for hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda.

Project Schedule

Out to bid: January 9, 2025

Site Visit: January 15, 2025 3:30PM at North Rockland High School

Bid Due: January 28, 2025 2:00PM at the Office of Facilities

AIA® Document A701™ – 2018

Instructions to Bidders

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

Sample

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

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

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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.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 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.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four 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.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name 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.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount

of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper copies of the Bid, the bid security, and any 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.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

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

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, 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 lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for 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.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect 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 Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
---------	-------	------	-------

.7 Addenda:

Number	Date	Pages
--------	------	-------

.8 Other Exhibits:

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

☐ AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

☐ The Sustainability Plan:

Title	Date	Pages
-------	------	-------

☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

Additions and Deletions Report for

AIA[®] Document A701[™] – 2018

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:50:40 ET on 10/14/2019.

PAGE 1

Sample

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, LEED, CPHC, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:50:40 ET on 10/14/2019 under Order No. 7102400339 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ - 2018, Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 001200-SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**GENERAL**

A. AIA Documents A701, 2018 Edition, "Instruction To Bidders", and its provisions, shall be considered an incorporated portion of Contract, unless specifically indicated to be omitted.

B. Where any Article of AIA A701, 2018 Edition, is modified by alteration, addition or deletion, provisions of such article shall remain in effect. All modifications shall be considered as added thereto. Where any such Article is amended, voided or superseded thereby, provisions of such Article not so specifically amended, voided or superseded shall remain in effect.

ARTICLE 1: DEFINITIONS

- A. To paragraph 1.6, add the following: " For additional requirements refer to Specification Section 01230-ALTERNATES."
- B. Add paragraph 1.10 as follows: " Where the term Architect or Engineer appears in the Documents, same refers to Michael R. Shilale Architects."
- C. Add paragraph 1.11 as follows: " For the purpose of the Documents, where the term Contractor appears in the Documents, same refers to the successful Contractor."

ARTICLE 2: BIDDER'S REPRESENTATIONS

- A. No modifications.

ARTICLE 3: BIDDING DOCUMENTS**3.1 COPIES**

- A. To subparagraph 3.1.1 delete the second sentence and replace with the following: "The deposit for each set will be refunded upon the return of the Contract Documents in good condition not later than thirty (30) days after the receipt of Bids."
- B. To subparagraph 3.1.1 add the following: "For bidding Documents to be deemed in good condition, they must be returned bound as issued, legible and containing only the markings necessary for bidding purposes."
- C. Add subparagraph 3.1.5 as follows: " Drawings and Project Manuals may be examined at the following locations:
 - 1. Michael Shilale Architects, L.L.P
140 Park Avenue
New City, NY 10956
 - 2. Office of Buildings and Grounds, NRSCD
65 Chapel Street
Garnerville, NY 10923
 - 3. REV plans
28 Church Street, Suite #7
Warwick, NY 10990

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- A. Add subparagraph 3.2.4 as follows: " In the absence of an interpretation by the Architect or Engineer, should the Drawings disagree in themselves or with the Specifications, the better quality, the more costly or the greater quantity of work or materials shall be estimated upon, and unless otherwise ordered, shall be furnished."

3.3 SUBSTITUTIONS

- A. Add subparagraph 3.3.5 as follows: " In the Specifications, two or more kinds, types, brands, or manufacturers or materials are named, are regarded as the required standard of quality, and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, manufacturer or material other than those named in the Specification, he shall indicate in writing, when requested, and prior to the award of Contract, what kind, type, brand or manufacturer is included in the Base Bid for the specified item."

3.4 ADDENDA

- A. To subparagraph 3.4.1 add the following: " All such Addenda shall become part of the Contract Documents and all Bidders shall be bound by such Addenda, whether or not received by the Bidders."
- B. To subparagraph 3.4.3 delete this paragraph and replace with the following: " No Addenda will be issued later than two (2) working 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."

ARTICLE 4: BIDDING PROCEDURE

4.2 BID SECURITY

- A. Add subparagraph 4.2.4 as follows: " Bids shall be accompanied by a Bid Security of not less than five percent (5%) of the amount of the Bid. Such Bid Security shall be submitted in the form of a Certified Check or Bid Bond made payable to the Owner. The submission shall be made with the understanding that the Bid Security shall guarantee that the Bidder will not withdraw his Bid for a period of forty five (45) days after the scheduled closing time for the receipt of Bids; and that if his Bid is accepted will enter into a formal contract with the Owner in accordance with the Form of Agreement included as part of the Contract Documents, and that the required Performance and Payment Bonds will be given; and that in the event of the withdrawal of said Bonds within ten (10) days after he has received notice of the acceptance of his bid, the Bidder shall be liable to the Owner for the full amount of the Bid Guarantee as representing the damage to the Owner as result of the default of Bidder in any particular hereof."
- B. Add subparagraph 4.2.5 as follows: " The Bid Securities shall be returned to all except the (3) three lowest Bidders within three (3) days after the formal opening of Bids. The remaining Bid Securities will be returned to the three (3) lowest Bidders within forty-eight (48) hours after the Owner and the accepted Bidder have executed the Contract and the executed Performance and Payment Bonds have been approved by the owner. If the required Contract and Bonds have not been executed within forty-five (45) days after the date of the opening Bids, then the Bond of any Bidder will be returned upon his request, provided he has not been notified of acceptance of his Bid prior to the date of such request."

4.4 MODIFICATION OR WITHDRAWAL OF BIDS

- A. Delete subparagraph 4.4.1 as written and replace with the following: " A Bid may not be withdrawn, modified or canceled for a period of forty-five (45) days after the scheduled closing time for the receipt of Bids, and each Bidder so agrees in submitting a Bid."

ARTICLE 5: CONSIDERATION OF BIDS

5.3 ACCEPTANCE OF BID (AWARD)

- A. To subparagraph 5.3.1 add the following: " The Owner may consider informal any Bid not prepared and submitted in accordance with all provisions of the Bidding Documents."

ARTICLE 6: POST-BID INFORMATION

6.3 SUBMITTAL

- A. Add subparagraph 6.3.5 as follows: " For additional requirements refer to General Conditions AIA A201, paragraph 5.2 AWARD OF SUBCONTRACTS & OTHER CONTRACTS FOR PORTIONS OF THE WORK."

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

7.2 TIME OF DELIVERY AND FORM OF BONDS

- A. To subparagraph 7.2.1 delete the first sentence and replace with the following: " The successful Bidder shall deliver the required Bonds to the Owner simultaneously with the executed Contract."
- B. To subparagraph 7.2.2 add the following: " The Performance and Payment Bonds shall have as surety there under such surety company or companies as are acceptable to the Treasury Department of the United States on Bonds given to the United States Government, and are authorized to do business in the State of New York. Premium on such Bonds shall be included in the Bid."

ARTICLE 8: FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

- A. No modifications.

Add " ARTICLE 9: SUPPLEMENTARY INSTRUCTIONS"

Add " 9.1 EXECUTION OF CONTRACT"

- A. Add subparagraph 9.1.1 as follows: " Successful Bidder shall, within ten (10) days after notification of him that the Contract is ready for execution, execute in triplicate and deliver to Owner all executed counterparts of Contract in form set forth in the Contract Documents."
- B. Add subparagraph 9.1.2 as follows: " Upon request by owner, successful Bidder shall, if corporation or an unincorporated association, file Certificate, evidencing fact that it is authorized to do business in the State of New York, or if conducting business under Assumed Name, file Count Clerk's Certificate to conduct business under such Assumed Name, and/or if conducting business as Partnership, file County Clerk's Certificate, evidencing filing with such Clerk of Certificate of Partnership."
- C. Add subparagraph 9.1.3 as follows: " Simultaneously with their delivery of executed Contract, successful Bidders shall deliver copies of Certificate of Insurance (AIA Form G705, 1978) for insurance specified in the Contract Documents."

Add" 9.2 UNIT PRICES"

- A. None at this time.

Add" 9.3 APPLICABLE STATE AND COUNTY SALES TAX"

- A. Add subparagraph 9.3.1 as follows: " New York State & County Taxes: The Owner has stated that all materials supplied in connection with the requirements of Work of this Contract are not subject to application of such Sales Tax. Should such Sales Taxes be imposed, Owner agrees that Contract Sum shall be increased by full amount of all such taxes."

END OF SECTION

SECTION 002110 – HIGHWAY LETTER

PART 1 - GENERAL

1.01 SUMMARY

- A. The following information in this section is provided for informational purposes only and shall not become part of the contract documents.

- 1. Highway Letter dated 01-11-24

January 11, 2024

Charles H. Vezzetti
Highway Superintendent
Rockland County Highway Department
23 New Hempstead
New City, New York 10956

Re: HS Chiller Replacement & HVAC Upgrade
SED No. 50-02-01-06-0-016-037

MSA Project No. 43065

Gentlemen:

On behalf of North Rockland Central School District and in conformance with the requirements of the New York State Education Department, we hereby notify you of the above referenced project.

The scope of work involves North Rockland High School Chiller Replacement and HVAC Upgrades at North Rockland Central School District. There are no proposed entries or exits on public highways and storm drainage will not be increased.

Complete sets of contract documents are available at the district office for review. If you should have any questions on the enclosed, please do not hesitate to contact our office.

Sincerely,

MICHAEL SHILALE ARCHITECTS, L.L.P



John P. Cirilli, AIA, LEED
Partner

cc: Michael Senno (NRCSD)
Michael R. Shilale, AIA, LEED, CPHC (MSA)

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PART 1 - GENERAL

1.01 GENERAL

- A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials, and equipment for North Rockland HS Chiller Replacement & HVAC Upgrades – General Construction, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled “HS Chiller Replacement & HVAC Upgrades – General Construction at North Rockland High School, 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923”, all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1. _____ Dollars

(Write out in words)

(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____ with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

HS Chiller Replacement and HVAC Upgrades

Total Project General Construction (\$ _____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 1: Void

Alternate No. 2:

Remove existing ceiling in annex gymnasium, prepare and paint existing exposed roof deck/structural steel/conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays for electrical wires. Install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

Alternate No. 3:

Remove existing ceiling in main gymnasium, prepare and paint existing exposed roof deck/structural steel/ conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays and electrical wires. install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting. Allowance No. 5 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

No allowances at this time.

1.02 TIME OF COMPLETION

A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, Substantial completion will be by August 22nd 2025. The punch list work will be completed by September 12th, 2025 and performed after school hours.

1.03 BID SECURITY

A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

No unit prices at this time.

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of 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 submit a bid for the purpose of restricting competition.

Resolved that _____

(Name of Individual)

be authorized to sign and submit the bid or proposal of this corporation for the following project

_____ and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by

Corporation at a meeting of its Board of Directors held on the

_____ day of _____, 20____.

(SEAL OF THE CORPORATION)

Secretary

1.07 ACCEPTANCE

- A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

- A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

- A. The undersigned hereby represents that it is a _____
(Corporation, Partnership, or an Individual). If a corporation, then the undersigned further represents that it is duly qualified as a corporation under laws of New York State and it is authorized to do business in this State.

1.10 DOL REGISTRATION REQUIREMENTS

- A. In compliance with section 220-i of the NY Labor Law. Contractors must be registered with NYS DOL before bidding on public work projects.
- B. Contractors are required to submit a valid DOL certificate of registration with this bid.
- C. Contractors must ensure that subcontractors are registered with DOL prior to commencing any work on public works projects.

1.11 PLACE OF BUSINESS

- A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed, or delivered.

(Name)

(Address)

(Telephone)

1.12 EXECUTION OF CONTRACT

- A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.13 ADDENDA

- A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum # _____
Addendum # _____
Addendum # _____
Addendum # _____
Addendum # _____
Addendum # _____

Dated _____
Dated _____
Dated _____
Dated _____
Dated _____
Dated _____

1.14 ASBESTOS

- A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated _____, 20____

Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

PART 1 - GENERAL

1.01 GENERAL

- A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials, and equipment for HS Chiller Replacement & HVAC Upgrades – HVAC, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "HS Chiller Replacement & HVAC Upgrades – HVAC at North Rockland High School, 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1. _____ Dollars

(Write out in words)

(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____ with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

HS Chiller Replacement and HVAC Upgrades

Total Project HVAC Construction (\$ _____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 1: Void

Alternate No. 2:

Remove existing ceiling in annex gymnasium, prepare and paint existing exposed roof deck/structural steel/conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays for electrical wires. Install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

Alternate No. 3:

Remove existing ceiling in main gymnasium, prepare and paint existing exposed roof deck/structural steel/ conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays and electrical wires. install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting. Allowance No. 5 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No. 1:

Clean existing main ductwork for 20 linear feet per unit
At RTUS D1 and D2.

(\$ _____)

Allowance No. 2:

Replace existing supply and return piping and insulation for
20 linear feet per unit at RTUS D1 and D2.

(\$ _____)

Allowance No. 3:

Provide proposal from third party HVAC commissioning agent
for owners to contract with (deduct allowance).

(\$ _____)

1.02 TIME OF COMPLETION

- A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, Substantial completion will be by August 22nd 2025. The punch list work will be completed by September 12th, 2025 and performed after school hours.

1.03 BID SECURITY

- A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES

- A. For work to be supplied or omitted at the price rate stipulated herein should the volume of work be increased, the following unit prices will be established as the limitations for such items of work, and each unit price shall include material, labor and services of each and everything necessary or required to complete for like work in kind, quality and function.

Unit Price No. 1:

Provide unit price to add or reduce to 10 linear feet of existing main ductwork
For each unit. Price is per 10 linear foot.

(\$ _____ per 10 linear feet)

Unit Price No. 2:

Provide unit price to add or reduce existing supply and return to piping
and insulation for 10 linear feet. Price is per 10 linear foot.

(\$ _____ per 10 linear feet)

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of 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 submit a bid for the purpose of restricting competition.

Resolved that _____

(Name of Individual)

be authorized to sign and submit the bid or proposal of this corporation for the following project

_____ and to include in such bid or proposal the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct copy of the resolution by

Corporation at a meeting of its Board of Directors held on the
_____ day of _____, 20____.

(SEAL OF THE CORPORATION)

Secretary

1.07 ACCEPTANCE

- A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

1.08 AFFIRMS

- A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

1.09 TYPE OF BUSINESS

- A. The undersigned hereby represents that it is a _____
(Corporation, Partnership, or an Individual). If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under laws of New York State and it is authorized to do business in this State.

1.10 DOL REGISTRATION REQUIREMENTS

- A. In compliance with section 220-i of the NY Labor Law. Contractors must be registered with NYS DOL before bidding on public work projects.
- B. Contractors are required to submit a valid DOL certificate of registration with this bid.
- C. Contractors must ensure that all subcontractors are registered with DOL prior to commencing any work on public works projects.

1.11 PLACE OF BUSINESS

- A. The following is the name and address of the person to whom all notices required in the connection with this Proposal may be telephoned, mailed or delivered.

(Name)

(Address)

(Telephone)

1.12 EXECUTION OF CONTRACT

- A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

1.13 ADDENDA

- A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

B.

Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____

1.14 ASBESTOS

- A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated _____, 20____

Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

PART 1 - GENERAL

1.01 GENERAL

- A. Pursuant to, and in compliance with, your Advertisement for Bids and the Information to Bidders relative thereto and all of the Contract Documents, including any Addenda issued by the Architect and mailed to the undersigned prior to the opening Bids, whether received by the undersigned or not, we

(CONTRACTOR NAME)

hereby proposes to furnish all plant, labor, supplies, materials and equipment for HS Chiller Replacement & HVAC Upgrades - Electrical, as required by and in strict accord with the applicable provisions of the Drawings and Specifications entitled "HS Chiller Replacement & HVAC Upgrades - Electrical at 106 Hammond Rd, Thiells, NY 10984 for the North Rockland Central School District, 65 Chapel Street, Garnerville, NY 10923 ", all to the satisfaction and approval of the Architect and the Owner in accordance with the terms and conditions of the Contract Documents for the following prices:

1. _____ Dollars

(Write out in words)

(_____) Base Bid for all work.

_____ Consecutive Calendar Days for substantial completion _____ with base bid.

The undersigned further proposes and agrees hereby to commence work with an adequate force and equipment immediately after being notified in writing to do so, and to achieve substantial completion for all work as required by the plans and specifications within the number of consecutive calendar days as itemized above.

HS Chiller Replacement & HVAC Upgrades

(\$ _____)

B. ALTERNATES

The undersigned further proposes and agrees that, should any of the following alternates be accepted and included in the Contract, the amount of the Base Bid, is hereto stated, shall be increased or decreased by the amounts indicated below.

Alternate No. 1: Void

Alternate No. 2:

Remove existing ceiling in annex gymnasium, prepare and paint existing exposed roof deck/structural steel/conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays for electrical wires. Install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

Alternate No. 3:

Remove existing ceiling in main gymnasium, paint existing exposed roof deck/structural steel/ conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays and electrical wires. install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting. Allowance No. 5 for cable rerouting will be accepted as part of this alternate.

(\$ _____)

C. ALLOWANCES

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.

Allowance No.4:

Allowance for cable routing in ceiling as part of alternate No. 2.

Contractor to provide time & material backup for work performed

(\$ 40,000.00)**Allowance No. 5:**

Allowance for cable routing in ceiling as part of alternate No. 3.

Contractor to provide time & material backup for work performed.

(\$ 40,000.00)**1.02 TIME OF COMPLETION**

- A. It is agreed by the undersigned that after receipt of Notice of Award and a consummation of a Contract Agreement in accord with the terms of the Contract Documents, Substantial completion will be by Augst 22nd 2025. The punch list work will be completed by September 12th, 2025 and performed after school hours.

1.03 BID SECURITY

- A. Attached hereto is Bid Security in the amount of five percent (5%) of the Base Bid.

1.04 UNIT PRICES**Unit Price No. 3:**

Provide unit price to add or reduce 10 linear feet of cable tray to alternates No. 2 and 3.

(\$ _____ per 10 linear feet)

1.06 NON-COLLUSIVE BIDDING CERTIFICATION

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of 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 submit a bid for the purpose of restricting competition.

Resolved that _____

(Name of Individual)

be authorized to sign and submit the bid or proposal of this corporation for the following project

_____ and to include in such bid or proposal

the certificate as to non-collusion required by Section One Hundred Three (d) (103d) of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalty of perjury.

The foregoing is a true and correct cop of the resolution by

Corporation at a meeting of its Board of Directors held on the
_____ day of _____, 20____.

(SEAL OF THE CORPORATION)

Secretary

1.07 ACCEPTANCE

- A. When this Proposal is accepted, the undersigned agrees to enter into Contract with the Owner as provided in the Form of Agreement.

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(Name)

(Address)

(Telephone)

1.12 EXECUTION OF CONTRACT

- A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

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- A. Any Addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____
Addendum # _____	Dated _____

1.14 ASBESTOS

- A. The Contractor certifies that no asbestos or asbestos-containing material will be incorporated into the Work of this Contract.

(Sign Bid Here)

Dated _____, 20____

Legal Name of Person, Partnership
or Corporation

By _____

Title _____

Address _____

AIA[®] Document A310[™] – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

BOND AMOUNT: \$**PROJECT:**

(Name, location or address, and Project number, if any)

S

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.

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

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

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

Init.

Signed and sealed this day of ,

(Principal) (Seal)

(Witness)

(Title)

(Surety) (Seal)

(Witness)

(Title)

Init.

Additions and Deletions Report for

AIA[®] Document A310[™] – 2010

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 11:52:13 on 06/28/2010.

PAGE 1

S

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, LEED, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:52:13 on 06/28/2010 under Order No. 3379937681_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A310™ – 2010, Bid Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 003126 – EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.1 SUMMARY

- A. The following information in this section is provided for informational purposes only and shall not become part of the contract documents.
 - 1. Bulk Sample Results
 - 2. XRF LBP Testing Results

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.1

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number	5844-01	5844-02	5844-03	5844-04
Layer Number				
Lab ID Number	2981917	2981918	2981919	2981920
Sample Location	1st Floor, Boiler Room, Wall	1st Floor, Boiler Room, Wall, Perimeter	1st Floor, Boiler Room, Wall, Between Block	1st Floor, Boiler Room, Wall, Perimeter, Between Block
Sample Description	Block	Block	Mortar	Mortar
Method of Quantification	Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes
	Homogenous	No	No	No
	Fibrous	No	No	No
	Color	Gray/Brown/White	Gray/Brown/White	Gray/White
Sample Treatment	Homogenized	Homogenized	Homogenized	Homogenized
Asbestos	% Amosite	ND	ND	ND
Content	% Chrysotile	ND	ND	ND
	% Other	ND	ND	ND
	% Total Asbestos	ND	ND	ND
Other Fibrous	% Fibrous Glass	ND	ND	ND
Materials	% Cellulose	ND	ND	ND
Present	% Other	ND	ND	ND
	% Unidentified	ND	ND	ND
Non-Fibrous	% Silicates	25.0	30.0	30.0
Materials	% Carbonates	25.0	25.0	25.0
Present	% Other	ND	ND	ND
	% Unidentified	50.0	45.0	45.0

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.1

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number	5844-05	5844-06	5844-07	5844-08
Layer Number				
Lab ID Number	2981921	2981922	2981923	2981924
Sample Location	1st Floor, Boiler Room, Boiler 2 Equipment Pad	1st Floor, Boiler Room, Chiller 1 Equipment Pad	1st Floor, Boiler Room, Floor	1st Floor, Boiler Room, Floor
Sample Description	Concrete	Concrete	Cementitious Slab	Cementitious Slab
Method of Quantification	Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes
	Homogenous	No	No	No
	Fibrous	No	No	No
	Color	Gray/Brown	Gray	Gray
Sample Treatment	Homogenized	Homogenized	Homogenized	Homogenized
Asbestos Content	% Amosite	ND	ND	ND
	% Chrysotile	ND	ND	ND
	% Other	ND	ND	ND
	% Total Asbestos	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	ND	ND	ND
	% Cellulose	ND	ND	ND
	% Other	ND	ND	ND
	% Unidentified	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	20.0	25.0	25.0
	% Carbonates	35.0	35.0	30.0
	% Other	ND	ND	ND
	% Unidentified	45.0	40.0	45.0

Results Applicable To Those Items Tested. Report Cannot be Reproduced, Except Entirely, Without Written Approval of the Laboratory. ND = Not Detected. Reporting Limit is <1%.

Liability Limited To Cost Of Analysis. This Report Must Not be Used by the Client to Claim Product Endorsement by NVLAP or Any Agency of the US Government.

These Results Can Not Be Used To Claim That NOB Items Tested Are Non-Asbestos Containing. Overall Lab Accuracy \pm 17%. Samples received in acceptable condition unless otherwise noted.

AIHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

Eastern Analytical Services, Inc.**Bulk Sample Results**

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Date Analyzed : 02/15/2024
Analyzed By : George Htay

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.1

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number		5844-09	5844-10	5844-11	5844-14
Layer Number					
Lab ID Number		2981925	2981926	2981927	2981928
Sample Location		1st Floor, Boiler Room, Ceiling, On Metal	1st Floor, Boiler Room, Ceiling, On Metal	1st Floor, Boiler Room, Ceiling, On Metal	1st Floor, Boiler Room, Boiler 1, Outside Boiler
Sample Description		SOFP * Vermiculite Observed, Analysis Terminated as per NYS-DOH 198.1	SOFP * Vermiculite Observed, Analysis Terminated as per NYS-DOH 198.1	SOFP * Vermiculite Observed, Analysis Terminated as per NYS-DOH 198.1	Insulation
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	No	No	No
	Homogenous	No	No	No	Yes
	Fibrous	Yes	Yes	Yes	Yes
	Color	Brown	Brown	Brown	Yellow
Sample Treatment		Homogenized	Homogenized	Homogenized	None
Asbestos Content	% Amosite	NA	NA	NA	ND
	% Chrysotile	NA	NA	NA	ND
	% Other	NA	NA	NA	ND
	% Total Asbestos	NA	NA	NA	ND
Other Fibrous Materials Present	% Fibrous Glass	NA	NA	NA	70.0
	% Cellulose	NA	NA	NA	ND
	% Other	NA	NA	NA	ND
	% Unidentified	NA	NA	NA	ND
Non-Fibrous Materials Present	% Silicates	NA	NA	NA	5.0
	% Carbonates	NA	NA	NA	ND
	% Other Vermiculite	NA	NA	NA	ND
	% Unidentified	NA	NA	NA	25.0

Results Applicable To Those Items Tested. Report Cannot be Reproduced, Except Entirely, Without Written Approval of the Laboratory. ND = Not Detected Reporting Limit is <1%.

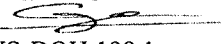
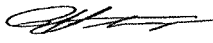
Liability Limited To Cost Of Analysis. This Report Must Not be Used by the Client to Claim Product Endorsement by NVLAP or Any Agency of the US Government.

These Results Can Not Be Used To Claim That NOB Items Tested Are Non-Asbestos Containing. Overall Lab Accuracy \pm 17%. Samples received in acceptable condition unless otherwise noted.

AIHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY


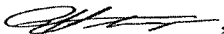
Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5844-15	5844-16	5844-20	5844-21
Layer Number				
Lab ID Number	2981929	2981930	2981931	2981932
Sample Location	1st Floor, Boiler Room, Boiler 1, Outside Boiler	1st Floor, Boiler Room, Boiler 2, Outside Boiler	1st Floor, Boiler Room, Hot Water Supply, On Metal Pipe	1st Floor, Boiler Room, Hot Water Supply, On Metal Pipe
Sample Description	Insulation	Insulation	Insulation	Insulation
Method of Quantification	Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered Homogenous Fibrous Color	No Yes Yes Yellow	No Yes Yes White	No Yes Yes White
Sample Treatment	None	None	None	None
Asbestos Content	% Amosite % Chrysotile % Other % Total Asbestos	ND ND ND ND	ND ND ND ND	ND ND ND ND
Other Fibrous Materials Present	% Fibrous Glass % Cellulose % Other % Unidentified	75.0 ND ND ND	75.0 ND ND ND	75.0 ND ND ND
Non-Fibrous Materials Present	% Silicates % Carbonates % Other % Unidentified	5.0 ND ND 20.0	5.0 ND ND 20.0	5.0 5.0 ND 15.0

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

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Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5844-22	5844-23	5844-24	5844-25
Layer Number				
Lab ID Number	2981933	2981934	2981935	2981936
Sample Location	1st Floor, Boiler Room, Hot Water Supply, On Metal Pipe	1st Floor, Boiler Room, Hot Water Supply, On Metal Pipe	1st Floor, Boiler Room, Chiller 2, On Metal Pipe	1st Floor, Boiler Room, Boiler 2, Hot Water Supply Line, On Metal Pipe
Sample Description	Insulation	Insulation	Insulation	Insulation
Method of Quantification	Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	No	Yes	Yes
	Homogenous	Yes	No	No
	Fibrous	Yes	Yes	Yes
	Color	White	Yellow	Brown/White/Silver
Sample Treatment	None	None	Homogenized	Homogenized
Asbestos	% Amosite	ND	ND	ND
Content	% Chrysotile	ND	ND	ND
	% Other	ND	ND	ND
	% Total Asbestos	ND	ND	ND
Other Fibrous	% Fibrous Glass	70.0	50.0	45.0
Materials	% Cellulose	ND	10.0	15.0
Present	% Other	ND	ND	ND
	% Unidentified	ND	ND	ND
Non-Fibrous	% Silicates	5.0	10.0	10.0
Materials	% Carbonates	5.0	ND	ND
Present	% Other	ND	ND	ND
	% Unidentified	20.0	30.0	30.0

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

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Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.1

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number		5844-28	5844-29	5844-30	5844-31
Layer Number					
Lab ID Number		2981937	2981938	2981939	2981940
Sample Location		Roof Access, Gym Annex, Mechanical Room, On Metal Elbow	Roof Access, Gym Annex, Mechanical Room, Hot Water Return, On Metal Elbow	Roof Access, Gym Annex, Mechanical Room, On Metal Fitting	Roof Access, Gym Annex, Mechanical Room, On Metal Pipe
Sample Description		Mudded Joint Packing	Mudded Joint Packing	Mudded Joint Packing	Insulation
Method of Quantification		Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered	Yes	Yes	Yes	No
	Homogenous	No	No	No	Yes
	Fibrous	Yes	Yes	Yes	Yes
	Color	Gray/Brown	Gray/Brown	Gray/Brown	Yellow/Brown
Sample Treatment		Homogenized	Homogenized	Homogenized	None
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Fibrous Materials Present	% Fibrous Glass	15.0	10.0	15.0	60.0
	% Cellulose	15.0	15.0	10.0	5.0
	% Other	ND	ND	ND	ND
	% Unidentified	ND	ND	ND	ND
Non-Fibrous Materials Present	% Silicates	20.0	15.0	20.0	5.0
	% Carbonates	20.0	20.0	20.0	ND
	% Other	ND	ND	ND	ND
	% Unidentified	30.0	40.0	35.0	30.0

Results Applicable To Those Items Tested. Report Cannot be Reproduced, Except Entirely, Without Written Approval of the Laboratory. ND = Not Detected. Reporting Limit is <1%.

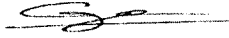

Liability Limited To Cost Of Analysis. This Report Must Not be Used by the Client to Claim Product Endorsement by NVLAP or Any Agency of the US Government.

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AIHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.1
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

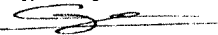
Sample ID Number	5844-32	5844-33	5897-03	5897-04
Layer Number				
Lab ID Number	2981941	2981942	2981943	2981944
Sample Location	Roof Access, Gym Annex, Mechanical Room, On Metal Pipe	Roof Access, Gym Annex, Mechanical Room, On Metal Pipe	Exterior, RTU B2, Bottom Layer, Curbing, On Wood	Exterior, RTU F2, Bottom Layer, Curbing, On Wood
Sample Description	Insulation	Insulation	Fiberboard	Fiberboard
Method of Quantification	Scanning Option	Scanning Option	Scanning Option	Scanning Option
Appearance	Layered Homogenous Fibrous Color	No Yes Yes Yellow/Brown	No No Yes Gray/Brown	No No Yes Gray/Brown
Sample Treatment	None	None	Homogenized	Homogenized
Asbestos Content	% Amosite % Chrysotile % Other % Total Asbestos	ND ND ND ND	ND ND ND ND	ND ND ND ND
Other Fibrous Materials Present	% Fibrous Glass % Cellulose % Other % Unidentified	60.0 5.0 ND ND	65.0 5.0 ND ND	ND 55.0 ND ND
Non-Fibrous Materials Present	% Silicates % Carbonates % Other % Unidentified	10.0 ND ND 25.0	5.0 ND ND 25.0	10.0 ND ND 30.0
				35.0

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/15/2024
Analyzed By : George Htay

Client: QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.1

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number	5897-05	5897-06
------------------	---------	---------

Layer Number

Lab ID Number	2981945	2981946
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Sample Location	Exterior, RTU F2, 2nd Layer	Exterior, RTU B2, 2nd Layer
-----------------	--------------------------------	--------------------------------

Sample Description	Perlite	Perlite
--------------------	---------	---------

Method of Quantification	Scanning Option	Scanning Option
--------------------------	-----------------	-----------------

Appearance	Layered	No	No
	Homogenous	No	No
	Fibrous	Yes	Yes
	Color	Brown	Brown

Sample Treatment	Homogenized	Homogenized
------------------	-------------	-------------

Asbestos	% Amosite	ND	ND
Content	% Chrysotile	ND	ND
	% Other	ND	ND
	% Total Asbestos	ND	ND

Other Fibrous	% Fibrous Glass	ND	ND
Materials	% Cellulose	35.0	30.0
Present	% Other	ND	ND
	% Unidentified	ND	ND

Non-Fibrous	% Silicates	5.0	10.0
Materials	% Carbonates	ND	ND
Present	% Other	20.0 Perlite	20.0 Perlite
	% Unidentified	40.0	40.0

Results Applicable To Those Items Tested. Report Cannot be Reproduced, Except Entirely, Without Written Approval of the Laboratory. ND = Not Detected. Reporting Limit is <1%.

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AHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

EAS Batch No. 2400705
Revision No. 1

Eastern Analytical Services, Inc.

Page 1 of 4

Bulk Sample Results

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/13/2024
Analyzed By : George Htay

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Signature : 

Analytical Method : NYS-DOH 198.6

NVLAP Lab Code : 101646-0 (Testing)

NYS Lab No. 10851

Paul Stascavage , Lab Director

Sample ID Number	5844-12	5844-13	5844-17	5844-18
Layer Number				
Lab ID Number	2981853	2981854	2981855	2981856
Sample Location	1st Floor, Boiler Room, Boiler 1, Outside Boiler, On Insulation	1st Floor, Boiler Room, Boiler 2, Outside Boiler, On Insulation	1st Floor, Boiler Room, Chiller 1	1st Floor, Boiler Room, Chiller 1
Sample Description	Insulation Wrap	Insulation Wrap	Insulation	Insulation
Analytical Method	NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered	Yes	No	No
	Homogenous	No	Yes	Yes
	Fibrous	Yes	No	No
	Color	White/Tan/Silver	Blue	Blue
Asbestos Content	% Amosite	ND	ND	ND
	% Chrysotile	ND	ND	ND
	% Other	ND	ND	ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic	35.5	73.5	71.8
	% Carbonates	13.1	16.7	14.8
	% Other Inorganic	51.4	9.8	13.4

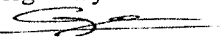
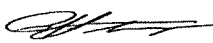
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AIHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/13/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

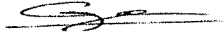

Sample ID Number	5844-19	5844-26	5844-27	5844-34
Layer Number				
Lab ID Number	2981857	2981858	2981859	2981860
Sample Location	1st Floor, Boiler Room, Chiller 2	1st Floor, Boiler Room, Chiller 2, On Flange	1st Floor, Boiler Room, Chiller 1, On Flange	Exterior, Gym Annex, Outside Mechanical Room, Louver, Metal Frame to Brick
Sample Description	Insulation	Gasket	Gasket	Caulk
Analytical Method	NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered Homogenous Fibrous Color	No Yes No Blue	No Yes No Black	No Yes No Gray
Asbestos Content	% Amosite % Chrysotile % Other	ND 23.0 ND	ND 21.1 ND	ND ND ND
	% Total Asbestos	ND Inconclusive	21.1	ND Inconclusive
Other Materials Present	% Organic % Carbonates % Other Inorganic	73.3 14.5 12.2	17.3 8.0 51.7	54.6 40.5 4.9

Results Applicable To Those Items Tested. Report Cannot be Reproduced, Except Entirely, Without Written Approval of the Laboratory. Samples received in acceptable condition unless otherwise noted. ND = Not Detected. Liability Limited To Cost Of Analysis. This Report Must Not be Used by the Client to Claim Product Endorsement by NVLAP or Any Agency of the US Government. These Results Cannot Be Used To Claim That NOB Items Tested Are Non-Asbestos Containing (Unless "% Other Inorganic", As Reported Above, Is Less Than One Percent). This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. AIHA LAP, LLC No. 100263 Rhode Island DOH No. AAL-072 Massachusetts DOL No. A A 000072 Connecticut DOH No. PH-0622 Maine DEP No. LA-024 Vermont DOH No. AL-709936

Eastern Analytical Services, Inc.

Bulk Sample Results

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

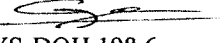
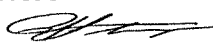
Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/13/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5844-35	5897-01	5897-02	5897-07
Layer Number				
Lab ID Number	2981861	2981862	2981863	2981864
Sample Location	Exterior, Gym Annex, Outside Mechanical Room, Louver, Metal Frame to Brick	Exterior, RTU F2, Top Layer	Exterior, RTU B2, Top Layer, Curb/Flashing	Exterior, RTU B2, 3rd Layer
Sample Description	Caulk	Rolled Roofing/ Built-up Roofing	Rolled Roofing/ Built-up Roofing	ISO Foam
Analytical Method	NOB Plm	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered Homogenous Fibrous Color	No Yes No Gray	Yes No No Black/Gray	No Yes No Yellow
Asbestos Content	% Amosite % Chrysotile % Other	ND ND ND	ND ND ND	ND ND ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic % Carbonates % Other Inorganic	53.9 38.7 7.4	57.8 17.6 24.6	55.5 21.5 23.0
				94.7 4.5 0.8

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY


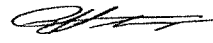
Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/13/2024
Analyzed By : George Htay
Signature : 
Analytical Method : NYS-DOH 198.6
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5897-08	5897-09	5897-10
Layer Number			
Lab ID Number	2981865	2981866	2981867
Sample Location	Exterior, RTU F2, 3rd Layer	Exterior, RTU F2, Bottom Layer, On Metal	Exterior, RTU B2, Bottom Layer, On Metal
Sample Description	ISO Foam	Tar/Rolled Roofing	Tar/Rolled Roofing
Analytical Method	NOB Plm	NOB Plm	NOB Plm
Appearance	Layered Homogenous Fibrous Color	No Yes No Yes Black/Brown	Yes No Yes Black/Brown
Asbestos Content	% Amosite % Chrysotile % Other	ND ND ND	ND ND ND
	% Total Asbestos	ND Inconclusive	ND Inconclusive
Other Materials Present	% Organic % Carbonates % Other Inorganic	30.3 28.1 41.6	52.1 20.4 27.5

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

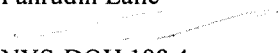
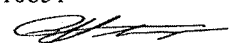
Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/14/2024
Analyzed By : Fahrudin Lalic
Signature : 
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5844-12	5844-13	5844-17	5844-18
Layer Number				
Lab ID Number	2981853	2981854	2981855	2981856
Sample Location	1st Floor, Boiler Room, Boiler 1, Outside Boiler, On Insulation	1st Floor, Boiler Room, Boiler 2, Outside Boiler, On Insulation	1st Floor, Boiler Room, Chiller 1	1st Floor, Boiler Room, Chiller 1
Sample Description	Insulation Wrap	Insulation Wrap	Insulation	Insulation
Analytical Method	NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered	Yes	No	No
	Homogenous	No	Yes	Yes
	Fibrous	Yes	No	No
	Color	White/Tan/Silver	Blue	Blue
Asbestos Content	% Amosite	ND	ND	ND
	% Chrysotile	ND	ND	ND
	% Other	ND	ND	ND
	% Total Asbestos	ND	ND	ND
Other Materials Present	% Organic	35.5	27.9	73.5
	% Carbonates	13.1	23.8	16.7
	% Other Inorganic	51.4	48.3	9.8
				13.4

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY


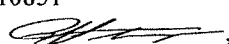
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Signature : 
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number		5844-19	5844-34	5844-35	5897-01
Layer Number					
Lab ID Number		2981857	2981860	2981861	2981862
Sample Location		1st Floor, Boiler Room, Chiller 2	Exterior, Gym Annex, Outside Mechanical Room, Louver, Metal Frame to Brick	Exterior, Gym Annex, Outside Mechanical Room, Louver, Metal Frame to Brick	Exterior, RTU F2, Top Layer
Sample Description		Insulation	Caulk	Caulk	Rolled Roofing/ Built-up Roofing
Analytical Method		NOB Tem	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered Homogenous Fibrous Color	No Yes No Blue	No Yes No Gray	No Yes No Gray	Yes No No Black/Gray
Asbestos Content	% Amosite	ND	ND	ND	ND
	% Chrysotile	ND	ND	ND	ND
	% Other	ND	ND	ND	ND
	% Total Asbestos	ND	ND	ND	ND
Other Materials Present	% Organic	73.3	54.6	53.9	57.8
	% Carbonates	14.5	40.5	38.7	17.6
	% Other Inorganic	12.2	4.9	7.4	24.6

Eastern Analytical Services, Inc.**Bulk Sample Results**

RE: CPN 24-5844 & 24-5897 - N Rockland CSD - Chillers & RTU's Proj, & Field's Phase 2 &
HVAC Upgrades - N Rockland HS - 106 Hammond Rd - Thiells, NY

Date Collected : 02/08/2024
Collected By : S. Talsma/Z. Timpano/K. Soltysiak
Date Received : 02/09/2024
Date Analyzed : 02/14/2024
Analyzed By : Fahrudin Lalic
Signature : 
Analytical Method : NYS-DOH 198.4
NVLAP Lab Code : 101646-0 (Testing)
NYS Lab No. 10851
Paul Stascavage , Lab Director

Client QuES&T, Inc.
1376 Route 9
Wappingers Falls, NY 12590

Sample ID Number	5897-02	5897-09	5897-10
Layer Number			
Lab ID Number	2981863	2981866	2981867
Sample Location	Exterior, RTU B2, Top Layer, Curb/Flashing	Exterior, RTU F2, Bottom Layer, On Metal	Exterior, RTU B2, Bottom Layer, On Metal
Sample Description	Rolled Roofing/ Built-up Roofing	Tar/Rolled Roofing	Tar/Rolled Roofing
Analytical Method	NOB Tem	NOB Tem	NOB Tem
Appearance	Layered Homogenous Fibrous Color	Yes No Yes Black/Brown	Yes No Yes Black/Brown
Asbestos Content	% Amosite % Chrysotile % Other % Total Asbestos	ND ND ND ND	ND ND ND ND
Other Materials Present	% Organic % Carbonates % Other Inorganic	55.5 21.5 23.0	30.3 28.1 41.6
			52.1 20.4 27.5

EQUIVALENCY

It is the intent of these specifications to allow approved equals for all materials specified where brand name, trade name, catalog reference, or patented commodity is referenced. References to such specific commodities are intended as descriptive, not restrictive, unless otherwise stated. Comparable products will be considered if proof of comparability is provided, including appropriate catalog excerpts, descriptive literature, specifications and list data, etc. The District architect/engineer's decision as to the acceptance of the product as equal will be final.

Officer of Company

Date

Company Name

Telephone

Address

North Rockland School District

65 Chapel Street
Garnerville, NY 10923

REFERENCE FORM

All work described shall be performed by an established contractor, which must document its ability to perform the contract in a timely, competent, and acceptable manner. Before the award is made, this contracting firm must submit proof to the Owner's satisfaction that it:

1. Has performed projects of a similar type at a minimum of 3 schools in the past three years.
2. Has been trained by the manufacturer for specific equipment in the proper installation of their equipment.
3. Is not a private residence.
4. Is fully equipped with spare parts and service vehicles to render proper service.
5. Has the ability to fully complete the entire project by the completion date specified elsewhere in the contract specifications.
6. Is able to respond to an emergency in 24 hours or less.

All bidders will be required to complete this form providing three references of past performance. References should involve projects and/or service situations of similar size and scope to bid this. References must have had dealings with the Bidder within the last thirty-six (36) months. The District reserves the right to contact any or all of the references supplied for an evaluation of past performance in order to establish the responsibility of the Bidder before the actual award of the bid and/or contract. Completion of the reference form is required.

BIDDER'S NAME: _____

DATE FILED: _____

OFFICER'S NAME: _____

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:

REFERENCE'S NAME:

ADDRESS:

TELEPHONE:



AIA Document A305™ – 1986

Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO:

ADDRESS:

SUBMITTED BY:

NAME:

ADDRESS:

PRINCIPAL OFFICE:

- ☐ Corporation
- ☐ Partnership
- ☐ Individual
- ☐ Joint Venture
- ☐ Other

NAME OF PROJECT (if applicable):

TYPE OF WORK (file separate form for each Classification of Work):

- ☐ General Construction
- ☐ HVAC
- ☐ Electrical
- ☐ Plumbing
- ☐ Other (please specify)

§ 1. ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor?

§ 1.2 How many years has your organization been in business under its present business name?

§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation:

§ 1.3.2 State of incorporation:

§ 1.3.3 President's name:

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 form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

§ 1.3.4 Vice-president's name(s)

§ 1.3.5 Secretary's name:

§ 1.3.6 Treasurer's name:

§ 1.4 If your organization is a partnership, answer the following:

§ 1.4.1 Date of organization:

§ 1.4.2 Type of partnership (if applicable):

§ 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:

§ 1.5.1 Date of organization:

§ 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

§ 2. LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

§ 3. EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

§ 4. REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

§ 5. FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

§ 6. SIGNATURE

§ 6.1 Dated at this day of

Name of Organization:

By:

Title:

§ 6.2

M being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

| Subscribed and sworn before me this day of 20

Notary Public:

My Commission Expires:

Additions and Deletions Report for

AIA[®] Document A305[™] – 1986

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 17:06:52 on 08/30/2005.

PAGE 4

Subscribed and sworn before me this day of 20-20

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 17:06:52 on 08/30/2005 under Order No. 1000150197_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A305™ – 1986 - Contractor's Qualification Statement, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)



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
(In words, indicate day, month, and year.)

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

North Rockland Central School District
65 Chapel Street
Garnerville, NY 10923
Telephone Number: 845-942-3000

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

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

HS Chiller Replacement and HVAC Upgrades

North Rockland High School
106 Hammond Road
Thiells, NY 10984

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

The Palombo Group
22 Noxon Street
Poughkeepsie, NY 12601
Telephone Number: 845-868-1239

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

Michael Shilale Architects, LLP
140 Park Ave
New City, NY 10956
Telephone Number: 845-708-9200

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

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

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

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

TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

(Paragraph Deleted)

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, the Notice to Bidders, Instructions to Bidders, sample forms, and the Contractor's bid, pricing proposals submitted by the Contractor and accepted by the Owner, 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.)

☐ The date of this Agreement.

☐ A date set forth in a notice to proceed issued by the Owner.

☐ Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

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

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

Init.

§ 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.)

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

Portion of Work

Substantial Completion Date

§ 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.)

☒ [X] Not later than () calendar days from the date of commencement of the Work.

☐ [] By the following date:

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work

Date to be substantially complete

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

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

(Check the appropriate box.)

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

☐ [] Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below

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

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

§ 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

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

Item	Price	Conditions for Acceptance
------	-------	---------------------------

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

Item	Price
------	-------

§ 4.2.4 Unit prices, if any:
(Identify the item and state the unit price, and quantity limitations, if any, to which the unit price will be applicable.)
 Any work to be performed under a unit price is acknowledged to be a change in the Work and will require a Change Order based upon an agreement among the Owner, Construction Manager, Architect and Contractor. Compensation and final unit price costs for any such work shall be subject to negotiation and approval by the Owner through a Change Order prior to the work being performed.

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

(Paragraphs Deleted)

(Paragraph Deleted)

(Paragraph Deleted)

(Paragraphs Deleted)

(Table Deleted)

(Paragraphs Deleted)

(Paragraph Deleted)

| *(Paragraph Deleted)*

| *(Paragraphs Deleted)*

| *(Table Deleted)*

| *(Paragraph Deleted)*

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| *(Table Deleted)*

| *(Paragraphs Deleted)*

| *(Table Deleted)*

| *(Paragraphs Deleted)*

| *(Paragraphs Deleted)*

| *(Paragraphs Deleted)*

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

§ 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 last 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.

§ 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.

(Paragraphs Deleted)

§ 5.1.7 Retainage

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

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

5%

§ 5.1.7.1.1 The following items are not subject to retainage:

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

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

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

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

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

§ 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.

Init.

§ 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, or as follows:

(Paragraphs Deleted)

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

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.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 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:

(Check the appropriate box.)

☐ Arbitration pursuant to Article 15 of AIA Document A232–2019.

☒ Litigation in a court of competent jurisdiction located in County where the project is located.

☐ Other: (Specify)

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 located in Country where the project is located.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

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

(Paragraphs Deleted)

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

(Paragraphs Deleted)

§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term “profit” shall be understood to mean the Contractor’s Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

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)

Kris Felicello, Superintendent
65 Chapel Street
Garnerville, NY 10923
Telephone Number: 845-942-3000
Email Address: kfelicello@northrockland.org

§ 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; the Rider attached to AIA Document A132–2019, Exhibit A regarding insurance requirements; 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.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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

§ 8.7 Relationship of the Parties

(Paragraph Deleted)

§ 8.8 Other provisions:

§ 8.8.1 This Agreement shall be governed by the laws of the State of New York.

§ 8.8.2 The Owner and Contractor, respectively, bind themselves, their agents, successors, assigns and legal representatives to the Agreement. Neither the Owner nor the Contractor shall assign this Agreement without the written consent of the other.

§ 8.8.3 Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against the Owner.

§ 8.8.4 Nothing contained in this Agreement shall be construed as creating any personal liability on the part of an officer, employee or agent of the Owner.

§ 8.8.5 Contractor agrees to comply with all New York State laws which may be applicable to this Agreement, and to require similar compliance from its subcontractors and consultants.

§ 8.8.6 Contractor, in accordance with its status as an independent contractor, covenants and agrees that it shall conduct itself in a manner consistent with such status, that it will neither hold itself nor its employees out as, nor claim to be an officer or employee of the Owner, and that it will not by reason hereof, make any claims, demand or application for any right or privilege applicable to an officer or employee of the Owner, including but not limited to workmen's compensation coverage, unemployment insurance benefits, Social Security coverage and retirement membership or credit.

§ 8.8.7 Contractor agrees to maintain sufficient on-site records and information necessary for the documentation of any and all facets of program operation specified by this Agreement. Contractor agrees to permit on-site inspection and auditing of all records, books, papers and documents associated with this Agreement by authorized representatives of the Owner, and further agrees to provide necessary staff support in the performance of such audit. Contractor agrees to maintain for a period of five (5) consecutive years following termination of this Agreement, any and all records, reports and other documentation arising from the performance of this Agreement; however, this period shall be extended beyond five years for any and all records and information pertaining to unresolved questions which have been brought to Contractor's attention by written notice.

(Paragraph Deleted)

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, with attached Rider

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

(Paragraphs Deleted)

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
---------	-------	------	-------

.7 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.

.8 Other Exhibits:

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

☐ AIA Document A132™–2019, Exhibit B, Determination of the Cost of the Work

☐ AIA Document E235™–2019, Sustainable Projects Exhibit, Construction Manager as Adviser Edition, dated as indicated below:
(Insert the date of the E235-2019 incorporated into this Agreement.)

☐ The Sustainability Plan:

☐ Exhibit “E”

Title	Date	Pages
-------	------	-------

☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 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.)

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

OWNER *(Signature)*

| Kris Felicello, Superintendent

(Printed name and title)

CONTRACTOR *(Signature)*

(Printed name and title)

Init.

/

Additions and Deletions Report for

AIA® Document A132® – 2019

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:26:47 ET on 12/01/2023.

PAGE 1

North Rockland Central School District
65 Chapel Street
Garnerville, NY 10923
Telephone Number: 845-942-3000

...

HS Chiller Replacement and HVAC Upgrades

North Rockland High School
106 Hammond Road
Thiells, NY 10984

...

The Palombo Group
22 Noxon Street
Poughkeepsie, NY 12601
Telephone Number: 845-868-1239

...

Michael Shilale Architects, LLP
140 Park Ave
New City, NY 10956
Telephone Number: 845-708-9200

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TABLE OF ARTICLES

...

EXHIBIT B – DETERMINATION OF THE COST OF THE WORK

...

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, the Notice to Bidders, Instructions to Bidders, sample forms, and the Contactor's bid, pricing

proposals submitted by the Contractor and accepted by the Owner, 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.

PAGE 3

[X] Not later than () calendar days from the date of commencement of the Work.

...

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

PAGE 4

§ 4.2.4 Unit prices, if any:

...

Any work to be performed under a unit price is acknowledged to be a change in the Work and will require a Change Order based upon an agreement among the Owner, Construction Manager, Architect and Contractor. Compensation and final unit price costs for any such work shall be subject to negotiation and approval by the Owner through a Change Order prior to the work being performed.

...

~~§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price~~

...

~~§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.~~

...

~~§ 4.3.2 The Contractor's Fee:~~

...

~~(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)~~

...

~~§ 4.3.3 The method of adjustment of the Contractor's Fee for changes in the Work:~~

...

~~§ 4.3.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:~~

...

~~§ 4.3.5 Rental rates for Contractor-owned equipment shall not exceed percent (%) of the standard rental rate paid at the place of the Project.~~

...

~~§ 4.3.6 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)

...

~~§ 4.3.7~~ The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

...

~~§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price~~

...

~~§ 4.4.1~~ The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

...

~~§ 4.4.2~~ The Contractor's Fee:

...

(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

...

~~§ 4.4.3~~ The method of adjustment of the Contractor's Fee for changes in the Work:

PAGE 5

~~§ 4.4.4~~ Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

...

~~§ 4.4.5~~ Rental rates for Contractor-owned equipment shall not exceed percent (%) of the standard rental rate paid at the place of the Project.

...

~~§ 4.4.6~~ 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)
------	-----------------------	-------------------------

...

§ 4.4.7 Guaranteed Maximum Price

...

~~§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed (\$), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.~~

...

§ 4.4.7.2 Alternates

...

~~§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:~~

...

Item	Price
------	-------

...

~~§ 4.4.7.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.~~

...

~~(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)~~

...

Item	Price	Conditions for Acceptance
------	-------	---------------------------

...

~~§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:~~

...

~~(Identify each allowance.)~~

...

Item	Price
------	-------

...

~~§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:~~

...

~~(Identify each assumption.)~~

...

~~§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.~~

...

~~§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.~~

...

~~§ 4.5 Liquidated damages, if any:~~

...

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

...

~~§ 4.6 Other:~~

...

~~(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)~~

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~~§ 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 last 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.~~

PAGE 7

~~§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a Guaranteed Maximum Price~~

...

~~§ 5.1.5.1 With each Application for Payment, the Contractor shall submit the cost control information required in Exhibit B, Determination of the Cost of the Work, along with payrolls, petty cash accounts, receipted invoices, or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or~~

Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor, plus payrolls for the period covered by the present Application for Payment, less that portion of the payments attributable to the Contractor's Fee.

...

~~§ 5.1.5.2 Applications for Payment shall show the Cost of the Work actually incurred by the Contractor through the end of the period covered by the Application for Payment and for which the Contractor has made or intends to make actual payment prior to the next Application for Payment.~~

...

~~§ 5.1.5.3 In accordance with AIA Document A232-2019 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:~~

...

~~§ 5.1.5.3.1 The amount of each progress payment shall first include:~~

...

~~.1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;~~

...

~~.2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and~~

...

~~.3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed sum Fee as the Cost of the Work included in Section 5.1.5.3.1.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.~~

...

~~§ 5.1.5.3.2 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;~~

...

~~.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and~~

...

~~.6 Retainage withheld pursuant to Section 5.1.7.~~

...

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

...

§ 5.1.5.5 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor, and such action shall not be deemed to be a representation that (1) the Construction Manager and Architect have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Article 5 or other supporting data; (2) that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

...

§ 5.1.5.6 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

...

§ 5.1.5.7 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

...

§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a Guaranteed Maximum Price

...

§ 5.1.6.1 With each Application for Payment, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

...

§ 5.1.6.2 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 Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

...

§ 5.1.6.2.1 The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

...

§ 5.1.6.2.2 The allocation of the Guaranteed Maximum Price under this Section 5.1.6.2 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

...

§ 5.1.6.2.3 When the Contractor allocates costs from a contingency to another line item in the schedule of values, the Contractor shall submit supporting documentation to the Architect and Construction Manager.

...

§ 5.1.6.3 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. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed; or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Contractor on account of that portion of the Work and for which the Contractor has made payment or intends to make payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

...

§ 5.1.6.4 In accordance with AIA Document A232-2019, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

...

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

...

- ~~1. That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;~~

...

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

...

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

...

~~.4 The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.~~

...

~~§ 5.1.6.4.2 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;~~

...

~~.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and~~

...

~~.6 Retainage withheld pursuant to Section 5.1.7.~~

...

~~§ 5.1.6.5 The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.~~

...

~~§ 5.1.6.6 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance~~

with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

...

~~§ 5.1.6.7 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.~~

...

~~§ 5.1.6.8 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.~~

...

5%

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~~§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price~~

...

~~§ 5.2.2.1 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;~~

...

~~.2—the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and~~

...

~~.3—a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.~~

...

~~§ 5.2.2.2 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, or as follows:~~

...

☒ Litigation in a court of competent jurisdiction located in County where the project is located.

...

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~~ jurisdiction located in Country where the project is located.

...

~~§ 7.1.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A232-2019, then the Owner shall pay the Contractor a termination fee as follows:~~

...

~~(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)~~

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~~§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price~~

...

~~§ 7.2.1 Termination~~

...

~~§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232-2019.~~

...

~~§ 7.2.1.2 Termination by the Owner for Cause~~

...

~~§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the Owner shall then only pay the Contractor an amount as follows:~~

...

~~.1 Take the Cost of the Work incurred by the Contractor to the date of termination;~~

...

~~.2 Add the Contractor's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;~~

...

~~.3 Subtract the aggregate of previous payments made by the Owner; and~~

...

~~4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232-2019.~~

...

~~§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232-2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.~~

...

~~§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.~~

...

~~§ 7.2.1.3 Termination by the Owner for Convenience~~

...

~~If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232-2019, then the Owner shall pay the Contractor a termination fee as follows:~~

...

~~(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)~~

...

Kris Felicello, Superintendent
65 Chapel Street
Garnerville, NY 10923
Telephone Number: 845-942-3000
Email Address: kfelicello@northrockland.org

...

~~§ 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; Bonds; the Rider attached to AIA Document A132-2019, Exhibit A regarding insurance requirements; and elsewhere in the Contract Documents.~~

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~~Where~~

...

§ 8.8 Other provisions:

...

~~the Contract is based on the Cost of~~ § 8.8.1 This Agreement shall be governed by the laws of the State of New York.

...

~~the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by~~ § 8.8.2 The Owner and Contractor, respectively, bind themselves, their agents, successors, assigns and legal representatives to the Agreement. Neither the Owner nor the Contractor shall assign this Agreement without the written consent of the other.

...

~~this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment~~ § 8.8.3 Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against the Owner.

...

~~in furthering the interests of the Owner;~~ § 8.8.4 Nothing contained in this Agreement shall be construed as creating any personal liability on the part of an officer, employee or agent of the Owner.

...

~~to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work~~ § 8.8.5 Contractor agrees to comply with all New York State laws which may be applicable to this Agreement, and to require similar compliance from its subcontractors and consultants.

...

~~in an expeditious and economical manner consistent with the Owner's interests. The Owner~~ § 8.8.6 Contractor, in accordance with its status as an independent contractor, covenants and agrees that it shall conduct itself in a manner consistent with such status, that it will neither hold itself nor its employees out as, nor claim to be an officer or employee of the Owner, and that it will not by reason hereof, make any claims, demand or application for any right or privilege applicable to an officer or employee of the Owner, including but not limited to workmen's compensation coverage, unemployment insurance benefits, Social Security coverage and retirement membership or credit.

...

~~agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.~~ § 8.8.7 Contractor agrees to maintain sufficient on-site records and information necessary for the documentation of any and all facets of program operation specified by this Agreement. Contractor agrees to permit on-site inspection and auditing of all records, books, papers and documents associated with this Agreement by authorized representatives of the Owner, and further agrees to provide necessary staff support in the performance of such audit. Contractor agrees to maintain for a period of five (5) consecutive years following termination of this Agreement, any and all records, reports and other

documentation arising from the performance of this Agreement; however, this period shall be extended beyond five years for any and all records and information pertaining to unresolved questions which have been brought to Contractor's attention by written notice.

...

§ 8.8 Other provisions:

...

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

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.3—2 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

...

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

...

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

...

[] Exhibit “E”

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Kris Felicello, Superintendent

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, LEED, CPHC, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:26:47 ET on 12/01/2023 under Order No. 4104241495 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A132™ - 2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

AIA® Document A132® – 2019 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year
(In words, indicate day, month, and year.)

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

HS Chiller Replacement and HVAC Upgrades

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

North Rockland Central School District
65 Chapel Street
Garnerville, NY 10923

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

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A232™–2019, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

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 Document A232™–2019, General Conditions of the Contract for Construction. Article 11 of A232™–2019 contains additional insurance provisions

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance 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. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss

Sub-Limit

§ A.2.3.1.2 **Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to false work and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's, Construction Manager's, and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage

Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- ☐ **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.
- ☐ **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.
- ☐ **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.
- ☐ **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.
- ☐ **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.
- ☐ **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.
- ☐ **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

- ☐ **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.

Init.

(Indicate applicable limits of coverage or other conditions in the fill point below.)

[] § A.2.5.2 Other Insurance

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than (\$) each occurrence, (\$) general aggregate, and (\$) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

Init.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than (\$) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than (\$) each accident, (\$) each employee, and (\$) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- [] § A.3.3.2.1 If there is only one Contractor performing the Work on the Project, property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

- [] § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for Work within fifty (50) feet of railroad property.
- [] § A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.
- [] § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.
- [] § A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.
- [] § A.3.3.2.6 Other Insurance
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Limits

Init.

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User Notes:

(3B9ADA41)

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type	Penal Sum (\$0.00)
Payment Bond	
Performance Bond	

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

Init.

Additions and Deletions Report for AIA® Document A132® – 2019 Exhibit A

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 13:58:26 ET on 12/01/2023.

PAGE 1

HS Chiller Replacement and HVAC Upgrades
North Rockland Central School District
65 Chapel Street
Garnerville, NY 10923

RIDER Attached to AIA Document A132-2019 Exhibit A - Regarding Insurance Requirements

1. Organizations coverage shall be primary and non-contributory coverage for the District/BOCES, its Board, employees and volunteers.
2. Additional insured status shall be provided by standard or other endorsements that extend coverage to the District/BOCES for on-going operations (CG 20 38) and products and completed operations (CG 20 37). The decision to accept an endorsement rest solely with the District/BOCES. A completed copy of the endorsements must be attached to the Certificate of Insurance.
 - a. The certificate of insurance must describe the services provided by the contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.
3. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing.
4. Add Under General Liability Coverage:
 - a. \$100,000 Fire Damage
 - b. \$10,000 Medical Expense
5. Umbrella/Excess and OCP requirements:
 - a. \$1 million/ occurrence, \$2 million/ aggregate with the District/BOCES as the Named Insured for projects less than or equal to \$1,000,000 and work on 1 Story (10 feet) only.
 - b. \$2 million/ occurrence, \$4 million/ aggregate with the District/BOCES as the Named Insured for projects greater than \$1,000,000 and work over 1 story (10 feet).
 - c. \$2 million/ occurrence, \$4 million/ aggregate with the District/BOCES as the named Insured for all projects where General Liability, Auto and Umbrella/Excess Coverage is with non-licensed and non-admitted carriers in New York State.
 - d. The District/BOCES will be the Named Insured on OCP Policies. There will be no Additional Insureds on any OCP Policies.
6. Umbrella/Excess Insurance:
 - a. \$5 million each Occurrence and Aggregate for General Construction and no work at elevation (1 story or 10 feet) or project values less than or equal to \$1,000,000.
 - b. \$10 million each Occurrence and Aggregate for high risk construction, work at elevation (greater than 1 story or 10 feet) or project values greater than \$1,000,000.

OWNER

North Rockland Central School District

CONTRACTOR

By: _____

By: _____



SAMPLE INSURANCE REQUIREMENTS – CAPITAL CONSTRUCTION

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

5. Minimum Required Insurance:

a. **Commercial General Liability Insurance**

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

\$2,000,000 Products and Completed Operations

\$1,000,000 Personal and Advertising Injury

\$100,000 Fire Damage

\$10,000 Medical Expense

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

b. **Owners Contractors Protective (OCP) Insurance**

For projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only;

\$1 million per occurrence, \$2 million aggregate with the District/BOCES as the Named Insured.

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

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

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

c. **Automobile Liability**

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

d. **Workers' Compensation and NYS Disability Insurance**

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

- e. **Builder's Risk**
Must be purchased by the contractor to include interest of the Owner and Contractor jointly in a form satisfactory to the owner. The limit must reflect the total completed value – all material and labor costs and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood.
 - f. **Umbrella/Excess Insurance**
\$5 million each Occurrence and Aggregate for general construction and no work at elevation (1 story – 10 feet) or project values less than or equal to \$1,000,000.

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

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

ADDITIONAL REQUIREMENTS ASBESTOS, LEAD ABATEMENT AND/OR HAZARDOUS MATERIALS

Asbestos/Lead Abatement/Pollution Liability Insurance

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

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

Testing Company Errors and Omission Insurance

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

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)

Sample

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond:

None

See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature: _____

Name and

Title: _____

SURETY

Company: (Corporate Seal)

Signature: _____

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.

Init.

§ 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.

Init.

§ 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.

Init.

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

§ 16 Modifications to this bond are as follows:

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

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: _____

Address: _____

SURETY

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: _____

Address: _____



AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$

Description:

(Name and location)

Sample

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond:

None

See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature:

SURETY

Company: (Corporate Seal)

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.

§ 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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§ 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

Company: _____
Signature: _____
(Corporate Seal)

SURETY

Company: _____
Signature: _____
(Corporate Seal)

Name and Title: _____
Address: _____

Name and Title: _____
Address: _____

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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)

HS Chiller Replacement and HVAC Upgrades

THE CONSTRUCTION MANAGER:

(Name, legal status, and address)

THE OWNER:

(Name, legal status, and address)

North Rockland Central School District
65 Chapel Street
Garnerville, NY 10923

THE ARCHITECT:

(Name, legal status, and address)

Michael Shilale Architects, LLP140 Pa
140 Park Avenue
New City, NY 10956

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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.

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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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. The Contract Documents include the Notice to Bidders, Instructions to Bidders, sample forms, and the Contractor's bid, and pricing proposals submitted by the Contractor and accepted by the Owner.

§ 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.

§ 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

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 to those matters New York State law vests the Board of Education with the power and duty to approve or authorize. 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.

The Contractor may not rely upon the direction of any employee of the Owner who has not been designated in writing by the Owner as the Owner's representative. The Owner shall not be responsible, financially or otherwise, for actions taken by the Contractor in reliance upon direction from unauthorized persons.

§ 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, provided that the Contractor has requested such evidence at least fourteen (14) days prior to the anticipated commencement of the Work.

§ 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 thirty (30) days of the Contractor's written 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..

§ 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' written 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, 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 and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall furnish, upon written request, only, and as necessary to complete the work, 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 reasonably 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

§ 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 five-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 where the Project is located. The Contractor shall designate in writing a representative who shall have

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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 carefully examined the Contract Documents and the site, and represents that the Contractor is thoroughly familiar with the nature and location of the Work, the site, the specific conditions under which the Work is to be performed, and all matters which may in any way affect the Work or its performance. The Contractor further represents that as a result of such examinations and investigations, the Contractor thoroughly understands the Contract Documents and their intent and purpose, and is familiar with all applicable codes, ordinances, laws, regulations, and rules as they apply to the Work, and that the Contractor will abide by same. Claims for additional time or additional compensation as a result of the Contractor's failure to follow the foregoing procedure and to familiarize itself with all local conditions and the Contract Documents are waived and will not be permitted.

§ 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. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents, without such notice to the Construction Manager and Architect, the Contractor shall assume responsibility for such performance and shall bear the attributable costs for correction.

§ 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 in writing 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.

§ 3.2.5 Where existing conditions are obscured or concealed from the Owner or Architect's view prior to the start of this Project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect do not imply or guarantee to the Contractor in any way that such portrayals in the Documents are accurate or true.

§ 3.2.5.1 Physical investigations and testing of existing conditions were not undertaken by the Architect, unless so indicated in the Contract Documents.

§ 3.2.5.2 The Contractor may submit written requests for information to the Architect to help facilitate the Contractor's performance of the contract. Prior to submitting each request for information, the Contractor shall first carefully study and compare the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, and prior Project correspondence and documentation to determine that the information to be requested is not reasonably obtainable from such sources.

§ 3.2.5.3 Each request for information shall be submitted to the Architect, in writing, with a copy to the Construction Manager. Each request for information shall identify the specific sources which were reviewed by the Contractor in an effort to determine the information requested, and a statement to the effect that the information being requested could not be determined from such sources.

§ 3.2.5.4 The Contractor shall submit each request for information sufficiently in advance of the date by which such information is requested in order to allow the Architect sufficient time, in the Architect's professional judgment, to permit adequate review and response and to permit Contractor compliance with the latest construction schedule.

§ 3.2.5.5 The Construction Manager shall maintain a log at the Project site that sequentially numbers and lists each request for information. This log shall contain the Drawings reference or Specification section to which the request pertains, the date of the request, to whom the request was made, by whom the request was made, the nature of the request, and the Architect's resolution thereof. This log shall be reviewed at each Project meeting and the status of the requests for information shall be made part of the minutes of such meetings.

§ 3.2.5.6 The Contractor shall reimburse the Owner amounts charged to the Owner by the Architect or Construction Manager for responding to Contractor requests for information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, or prior Project correspondence or documentation.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. 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.

§ 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 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, to the extent practicable, 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 The Owner, through the Construction Manager, shall secure and pay for the building permit from the New York State Education Department. The Contractor shall secure and pay for all other permits, fees, licenses, and inspections by government agencies necessary for proper execution of and completion of the contract, which are legally required.

§ 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.

§ 3.7.2.1 The Contractor shall comply with all applicable New York State Department of Labor requirements, including the provision that every worker employed in performance of a public work contract shall be certified as having completed an OSHA 10-hour safety training course. The Contractor and Subcontractor shall be solely responsible for compliance with this requirement with respect to their employees. The Contractor's or Subcontractor's failure to comply with this requirement shall not transfer or in any way impose the responsibility for worker safety upon the Owner or the Architect.

3.7.2.2 In accordance with New York State Labor Law Article 8, Section 220, subd. 3-a(a), the Contractor shall submit to the Owner within thirty (30) days after issuance of Contractor's first payroll, and every thirty (30) days thereafter, a transcript of the original payroll record, subscribed and affirmed as true under the penalties of perjury.

§ 3.7.3 If the Contractor or Subcontractor performs Work which it knows or should have known was 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 (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 in writing

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.

(Paragraph Deleted)

.1 Contingency Allowances shall cover the direct cost to the Contractor and Subcontractors for labor, materials and equipment, including delivery, unloading, storage, handling and installation. They do not include the

Contractor's overhead and profit, the costs of bonds, insurance, administration and supervision, all of which should be carried as part of the Contract Sum.

.2 The Architect shall create and process Allowance Access Authorizations for the Construction Manager and Owner's approval and execution in accordance with the Contract Documents.

§ 3.8.2 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 and designate 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. The superintendent shall be in attendance at the Project site full time throughout the work, including the completion of the punch list.

§ 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.

§ 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 maintain and 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 in good order and condition. 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 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.

§ 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.

§ 3.13.3 The Contractor shall be responsible for enforcing the Owner's security and access policies and procedures, the Owner's Code of Conduct, and the following rules of conduct for its personnel and those of its subcontractors, sub-subcontractors, and suppliers at the Project site, and the Owner's Project Representative shall provide interpretations should a question arise if the rules of conduct are being adequately enforced by the Contractor:

- .1 No smoking or use of tobacco products.
- .2 No drinking of alcoholic beverages or use of controlled substances.
- .3 No working, or presence on site, under the influence of alcoholic beverages or controlled substances.
- .4 No use of indecent language or display of indecent images, publications or terms.
- .5 No use of radios or other entertainment devices.
- .6 No horseplay or dangerous behavior.
- .7 No firearms or other weapons.

Note to Specifier: Retain the following subparagraph for a school project.

- .8 No communication with staff or students.

§ 3.13.4 The Contractor shall require its personnel and those of its subcontractors, sub-subcontractors and suppliers to wear visible photo-identification badges acceptable to the Owner, at all times for identification and security purposes.

§ 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 defend, indemnify and hold harmless the Owner, Construction Manager, Architect, each of their consultant's, officers, board members, agents, and employees from and against any suits, claims, damages, losses, or expenses, including but not limited to attorneys' fees and litigation costs, arising out of or resulting from performance of the Work, provided that such suit, claim, damage, loss or expense is attributable to any bodily injury, sickness, disease, or death, or injury to or destruction of any tangible property, including loss of use resulting therefrom, but only to the extent caused in whole or in part by the act, omission, fault, breach of contract, breach of warranty or statutory violation of the Contractor, a subcontractor, or any person or entity directly or indirectly employed by them, or any person or entity for whose acts they may be liable or arises out of operation of law as a consequence of any act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of the above may be liable, regardless of whether any of them has been negligent.

§ 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 insurance policies, 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 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, and the Owner, in writing 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 Contractor, in coordination with the Architect, will prepare 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.

§ 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 Intentionally Omitted.

§ 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, but no later than fourteen (14) days prior to the start of construction, shall furnish in writing to 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.

§ 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, but not limited to, the responsibility for safety of the Subcontractor's Work, and obligations to defend and indemnify 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.

§ 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, in writing and in detail, any 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..

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§ 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.

§ 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 Contractor 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 and equipment normally encumbered to perform the work, whether rented from the Contractor or others; and

.4 Costs of supervision and field office personnel directly attributable to the change.

.5 Overhead and profit mark-up shall include, but not be limited to, the following:

- .1 home office expenses;
- .2 field office expenses;
- .3 supervision;
- .4 project management & estimation; and
- .5 small tolls & equipment.

§ 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.

§ 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. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 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 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. Extensions of time must be requested by the Contractor in writing, and shall only be considered after the Contractor has made reasonable efforts, at no cost to the Owner, to recover the lost time.

§ 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

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.

§ 9.3.1.4 When the work or major portions thereof as contemplated by the terms of the Contract are substantially complete, the Contractor shall submit to the Construction Manager and Architect a requisition for payment of the remaining amount of the Contract balance. Upon receipt of such requisition, the Owner shall approve and promptly pay the remaining amount of the Contract less two times the value of any remaining items to be completed and an amount necessary to satisfy any claims, liens or judgments against the Contractor, which have not been suitably discharged, as determined by the Architect in conjunction with the Construction Manager. Any claims, liens or judgments referred to in this clause shall pertain to the Project and shall be filed in accordance with the terms of the Contract, and applicable laws.

§ 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, provided the Owner has authorized such delivery and storage of materials at the site in advance. 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. The Owner shall have the right, at any time on reasonable notice to inspect materials and equipment which have been stored off the site in accordance with this paragraph.

§ 9.3.2.1 Proof of insurance for items stored off site and copies of invoices are to be provided with Applications for Payment requesting payment for stored materials.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, 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 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;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 failure of Contractor to provide executed supplementary bid forms, performance and payment bonds or a current Certificate of Insurance.

§ 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 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 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 Intentionally Omitted

§ 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.

§ 9.8.1.1 No later than 14 days prior to the Contract-scheduled date of Substantial Completion, the Contractor shall issue a letter to the Architect and Construction Manager confirming their work is on schedule for

Substantial

Completion by the contract specified date. No later than seven days after Contract-scheduled date of Substantial Completion (including authorized adjustments), the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. Absent the Contractor letter confirming readiness of work, the Architect may elect to postpone the substantial completion inspection. If the Architect's inspection discloses any item 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 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 to determine the actual date of Substantial Completion.

§ 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 Contractor's punch 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 punch 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 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.

§ 9.8.6 In the event the Contractor does not achieve final completion within sixty (60) days after the date of Substantial Completion, allowing for any approved extensions of the Contract time, Contractor shall not be entitled to any further payment and Contractor agrees that such failure to complete the work within the time set forth above shall constitute a waiver of all claims by the Contractor to any money that may be due. This provision shall not operate as a waiver by the Owner of any claims or remedies of any nature against the Contractor arising out of the Contract.

§ 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 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.

§ 9.10.6 If the Contractor is responsible for delays in the final completion and closeout beyond the contract specified time, the Owner shall be entitled to reimbursement from the Contractor for amounts paid by the Owner to subsequently extend the Electronic Submittal System (Submittal Exchange).

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.

§ 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, written 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 written 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 Intentionally omitted.

§ 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.

(Paragraph Deleted)

§ 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. The required insurance will, at a minimum, protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be held legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any one of them, or by anyone for whose acts any of them may be liable:

1. Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed, including private entities performing Work at the site and exempt from the coverage on account of the number of employees or occupation, such entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;
2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees or persons or entities excluded by statute from the requirements of Clause 11.1.1.1, but required by the Clause;

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- .3 Claims for damages because of bodily injury, occupational sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage; which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations;
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 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 The required insurance shall meet the minimum requirements set forth in the Rider attached to AIA Document A132-2019, Exhibit A regarding insurance requirements, and elsewhere in the Contract Documents.

§ 11.1.5 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 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.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within seven (7) 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 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. 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.

§ 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. The parties expressly agree that any claim, dispute or other controversy of any nature arising out of the Contract or performance of the Work shall be commenced and maintained in Supreme Court, Rockland County, or the United State District Court, Southern District of New York, if applicable.

§ 13.1.2 The Contractor shall at all times observe and comply with all Federal and State Laws, and all Laws, Ordinances and Regulations of the Owner, in any manner affecting the work, and all such orders decreed as exist at present and those which may be enacted later, by bodies or tribunals having jurisdiction or authority over the Work, and the Contractor shall defend, indemnify and save harmless the Owner, Construction Manager and Architect and all their officers, agents or servants against any claim or liability arising from, or based on, a violation of any such law, ordinances, regulation or order, whether by himself or by his employee or agents.

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

- .1 No laborer, workman or mechanic in the employ of the Contractor, subcontractor or other person doing contracting or contracting to do the whole or any part of the work contemplated by the Contract, shall be permitted or required to work more than eight hours in one calendar day or more than five days in one week, except in the emergencies set forth in the Labor Law.
- .2 The wages paid for a legal day's work shall not be less than the prevailing rate of wages as defined by law, and
- .3 The minimum hourly rate of wages to be paid shall not be less than that stated in the Specifications, and any re-determination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of this Contract. The Labor Law provides that the Contract may be forfeited and no sum paid for any work done thereunder on a second conviction of willfully paying less than:
 1. the stipulated wage scale as provided in Labor Law, Section 220, Sub-division 3, as amended; or
 1. the stipulated minimum hourly wage scale as provided in Labor Law, 220-d, as amended.

§ 13.1.4 The Contractor specifically agrees as required by the provisions of Labor Law, Section 220-e, as amended that:

- .1 In hiring of employees for the performance of work under this Contract or any subcontract hereunder for the manufacture, sale, or distribution of materials, equipment or supplies, hereunder, no Contractor or Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, disability, sex, or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.
- .2 No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee under this Contract on account of race, creed, color, disability, sex, or national origin.
- .3 There may be deducted from the amount payable to the Contractor by the Owner under this Contract, a penalty of fifty dollars (\$50) for each person for each calendar day during which such a person was discriminated against or intimidated in violation of the provisions of the Contract, and
- .4 The provisions of this section covering every Contract for or on behalf of the Owner, the State or a municipality for the manufacture or sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

§ 13.1.5 During the performance of this Contract, the Contractor agrees as follows:

- .1 The Contractor will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.
- .2 If directed to do so by the Owner or the State Commissioner of Human Rights, the Contractor will send to each labor union or representative of workers which with the Contractor has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commissioner of Human Rights, advising such labor union or representative of the Contractor's agreement under

clauses (1) through (6) (hereinafter called "non-discrimination clauses"). If the Contractor was directed to do so by the Owner as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish a written statement that such a labor union representative will not discriminate because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, or marital status, and that such labor union or representative will cooperate, within the limits of its legal contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses and that it consents and agrees that the recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provision of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the Owner and the State Commissioner of Human Rights of such failure or refusal.

- .3 If directed to do so by the Owner or the Commissioner of Human Rights, the Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commissioner of Human Rights setting forth the substance of provisions of clauses (1) and (2) and such provision of the State's law against discrimination as the State Commissioner of Human Rights shall determine.
- .4 The Contractor will state in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.
- .5 The Contractor will comply with the provisions of Sections 290-299 of the Executive Law, and with the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these non-discrimination clauses and such section of the Executive Law, and will permit access to the Contractor's books, records, and accounts by the Owner, the State Commissioner of Human Rights, the Attorney General and the Industrial Commissioner for the purposes of investigation to ascertain compliance with the non-discrimination clauses and such sections of the Executive Law Civil Rights Law.
- .6 This Contract may be forthwith cancelled, terminated or suspended, in whole or in part, by the Owner upon the basis of a finding made by the State Commissioner of Human Rights that the Contractor has not complied with the non-discrimination clauses, and that the Contractor may be declared ineligible for future contracts made by or on behalf of the Owner, the State or a public authority or agency of the State, until the Contractor satisfies the State Commissioner of Human Rights that the Contractor has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings may be made by the State Commissioner of the Human Rights after conciliation efforts by the Commissioner have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commissioner, notice thereof has been given to the Contractor to be heard publicly in accordance with the Executive Law. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law, and
- .7 The Contractor will include the provisions of clauses .1 through .6 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 action in enforcing such provisions of such subcontract or purchase order as the State Commissioner of Human Rights or the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved or is threatened with litigation with a subcontractor or vendor as a result of such directions by the State Commissioner of Human Rights or the Owner, the Contractor shall promptly so notify the Owner and the Attorney General requesting the Attorney General to intervene and protect the interests of the State of New York.

§ 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 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 to Contractor, including any interest, shall be consistent with this Agreement and in accordance with New York State General Municipal Law Section 106-b.

13.6 Equal Opportunity

§ 13.6.1 The Contractor shall maintain policies of employment as follows:

.1 The Contractor and the Contractor's subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notice setting forth the policies of non-discrimination.

.2 The Contractor and the Contractor's subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

§ 13.7 Wage Rates

§ 13.7.1 The Contractor shall comply with Prevailing Wage Rates issued and periodically updated, by the New York State Department of Labor, for the location and duration of the Project.

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; or
- .3 Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents;

(Paragraph Deleted)

§ 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, under direct or indirect contract with the Contractor, 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 thirty (30) days' written notice to the Owner with reasonable opportunity to cure, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work properly executed.

§ 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 thirty (30) 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 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 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;

Init.

- .4 otherwise breaches a material provision of the Contract Documents;
- .5 breaches any warranty made by the Contractor under or pursuant to the Contract Documents; or
- .6 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all of the requirements of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven 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. The costs of finishing the Work include, without limitations, all reasonable attorney's fees incurred by the Owner, additional Architect/Engineering and Construction Manager costs, insurance, additional interest because of any delay in completing 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.

§ 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 may be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. 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 Notwithstanding any other provision to the contrary in this Agreement, the Owner reserves the right at any time and in its absolute discretion to terminate the services of the Contractor and/or the Work for the Owner's convenience and without cause by giving written notice to the Contractor. This termination for the convenience of the Owner provision allows and authorizes the Owner to terminate this Agreement at any time and for any reason whatsoever. This right may be exercised by the Owner in its complete discretion.

§ 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
- .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 the case of such termination for the Owner's convenience, the Contractor shall be entitled to, and the Owner shall reimburse the Contractor for, an equitable portion of the Contractor's fee based on the portion of the Work properly completed before the effective date of termination. Contractor's entitlement to payment for all such work shall be predicated on its performance of such work in accordance with the Contract Documents as certified by

the Architect and Construction Manager. Contractor shall be entitled to no other payment and waives any claim for damages.

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.

§ 15.1.2.1 Claims by the Contractor must be made by written notice in accordance with the following procedures.

- .1 the Contractor may submit a claim concerning a matter properly noticed in accordance with the time requirements of this Contract set forth in paragraph 15.1.2 and elsewhere;
- .2 failure by the Contractor to furnish the required claim documentation within the time set forth above shall constitute waiver of the Contractor's right to compensation for such claim.
- .3 Contractor shall furnish three (3) certified copies of the required claim documentation. The claim documentation shall be complete when furnished. The evaluation of the Contractor's claim will be based, among other things, upon the Owner's Project Records and the Contractor's furnished claim documentation
- .4 claim documentation shall conform to Generally Accepted Accounting Principles and shall be in the following format:
 1. general introduction;
 2. general background discussion
 3. issues
 1. index of issues (listed numerically);
 2. for each issue:
 1. background
 2. chronology
 3. Contractor's position (reason for Owner's potential liability)
 4. supporting documentation of merit or entitlement
 5. supporting documentation of damages
 6. begin each issue on a new page
4. all critical path method schedules (as-planned, monthly updates, schedule revisions and as-built, along with computer disks of all schedules related to the claim;
5. productivity exhibits (if appropriate); and
6. summary of issues and damages.
- .5 supporting documentation of merit for each issue shall be cited by reference, photocopies or explanation. Supporting documentation may include, but shall not be limited to General Conditions, General Requirements, technical specifications, drawings, correspondence, conference notes, shop drawings and submittals, shop drawing logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary CPM schedules or time impact analyses, photographs, technical reports, requests for information, field instructions and all other related records necessary to support the Contractor's claim.
- .6 supporting documentation of damages for each issue shall be cited, photocopied or explained. Supporting documentation may include, but shall not be limited to, any or all documents related to the preparation and submission of the bid; certified, detailed labor records including labor distribution reports; material and equipment procurement records; construction equipment ownership, cost records or rental records; subcontractor or vendor files and cost records; service cost

records; purchase orders; invoices; Project as-planned and as-built cost records; general ledger records; variance reports; accounting adjustment records, and any other accounting material necessary to support the Contractor's claims.

- .7 each copy of the claim documentation shall be certified by a responsible officer of the Contractor in accordance with the requirements of these Contract Documents.

§ 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 Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments on non-disputed items 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. In the case of a continuing delay only one Claim is necessary.

§ 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 waives Claims for consequential damages arising out of or relating to this Contract. This waiver includes

- .1 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 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 If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Architect, the Architect will render to the parties the Architect's written recommendation relative to the Claim, including any recommended change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 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 thirty (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 within 30 days of receipt thereof, then both parties waive their rights to mediate.

§ 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 Intentionally omitted.

§ 15.3.2 The parties may 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.

§ 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.

Init.

§ 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.

Additions and Deletions Report for

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HS Chiller Replacement and HVAC Upgrades

North Rockland Central School District

65 Chapel Street

Garnerville, NY 10923

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Michael Shilale Architects, LLP140 Pa

140 Park Avenue

New City, NY 10956

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§ 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.~~ The Contract Documents include the Notice to Bidders, Instructions to Bidders, sample forms, and the Contractor's bid, and pricing proposals submitted by the Contractor and accepted by the Owner.

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§ 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.~~ authorization, except as to those matters New York State law vests the Board of Education with the power and duty to approve or authorize. 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.~~ The Contractor may not rely upon the direction of any

employee of the Owner who has not been designated in writing by the Owner as the Owner's representative. The Owner shall not be responsible, financially or otherwise, for actions taken by the Contractor in reliance upon direction from unauthorized persons.

...

§ 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.~~ evidence, provided that the Contractor has requested such evidence at least fourteen (14) days prior to the anticipated commencement of the Work.

...

§ 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~~ thirty (30) days of the Contractor's written 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.~~ provided..

...

§ 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' written 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.

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§ 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~~ furnish, upon written request, only, and as necessary to complete the work, 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 reasonably rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

...

§ 2.3.7 ~~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.~~

...

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ~~ten-day~~ five-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.

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§ 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, carefully examined the Contract Documents and the site, and represents that the Contractor is thoroughly familiar with the nature and location of the Work, the site, the specific conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents, all matters which may in any way affect the Work or its performance. The Contractor further represents that as a result of such examinations and investigations, the Contractor thoroughly understands the Contract Documents and their intent and purpose, and is familiar with all applicable codes, ordinances, laws, regulations, and rules as they apply to the Work, and that the Contractor will abide by same. Claims for additional time or additional compensation as a result of the Contractor's failure to follow the foregoing procedure and to familiarize itself with all local conditions and the Contract Documents are waived and will not be permitted.

...

§ 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. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents, without such notice to the Construction Manager and Architect, the Contractor shall assume responsibility for such performance and shall bear the attributable costs for correction.

...

§ 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 in writing 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.

...

§ 3.2.5 Where existing conditions are obscured or concealed from the Owner or Architect's view prior to the start of this Project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect do not imply or guarantee to the Contractor in any way that such portrayals in the Documents are accurate or true.

PAGE 8

§ 3.2.5.1 Physical investigations and testing of existing conditions were not undertaken by the Architect, unless so indicated in the Contract Documents.

...

§3.2.5.2 The Contractor may submit written requests for information to the Architect to help facilitate the Contractor's performance of the contract. Prior to submitting each request for information, the Contractor shall first carefully study and compare the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, and prior Project correspondence and documentation to determine that the information to be requested is not reasonably obtainable from such sources.

...

§ 3.2.5.3 Each request for information shall be submitted to the Architect, in writing, with a copy to the Construction Manager. Each request for information shall identify the specific sources which were reviewed by the Contractor in an effort to determine the information requested, and a statement to the effect that the information being requested could not be determined from such sources.

...

§ 3.2.5.4 The Contractor shall submit each request for information sufficiently in advance of the date by which such information is requested in order to allow the Architect sufficient time, in the Architect's professional judgment, to permit adequate review and response and to permit Contractor compliance with the latest construction schedule.

...

§ 3.2.5.5 The Construction Manager shall maintain a log at the Project site that sequentially numbers and lists each request for information. This log shall contain the Drawings reference or Specification section to which the request pertains, the date of the request, to whom the request was made, by whom the request was made, the nature of the request, and the Architect's resolution thereof. This log shall be reviewed at each Project meeting and the status of the requests for information shall be made part of the minutes of such meetings.

...

§ 3.2.5.6 The Contractor shall reimburse the Owner amounts charged to the Owner by the Architect or Construction Manager for responding to Contractor requests for information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner provided information, Contractor prepared Coordination Drawings, or prior Project correspondence or documentation.

§ 3.5.1 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.~~ defects 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.

...

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

...

§ 3.7.1 ~~Unless otherwise provided in the Contract Documents, the Owner, assisted by~~ The Owner, through the Construction Manager, shall secure and pay for the building permit. ~~permit from the New York State Education Department.~~ The Contractor shall secure and pay for all 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. ~~of and completion of the contract, which are legally required.~~

...

§ 3.7.2.1 The Contractor shall comply with all applicable New York State Department of Labor requirements, including the provision that every worker employed in performance of a public work contract shall be certified as having completed an OSHA 10-hour safety training course. The Contractor and Subcontractor shall be solely responsible for compliance with this requirement with respect to their employees. The Contractor's or Subcontractor's failure to comply with this requirement shall not transfer or in any way impose the responsibility for worker safety upon the Owner or the Architect.

...

§ 3.7.2.2 In accordance with New York State Labor Law Article 8, Section 220, subd. 3-a(a), the Contractor shall submit to the Owner within thirty (30) days after issuance of Contractor's first payroll, and every thirty (30) days thereafter, a transcript of the original payroll record, subscribed and affirmed as true under the penalties of perjury.

...

§ 3.7.3 If the Contractor ~~performs Work knowing it to be or~~ Subcontractor performs Work which it knows or should have known was 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 (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 in writing 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.

...

§ 3.8.1 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; Contingency Allowances shall cover the direct cost to the Contractor and Subcontractors for labor, materials and equipment, including delivery, unloading, storage, handling and installation. They do not include the~~

...

~~.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 Contractor's overhead and profit, the costs of bonds, insurance, administration and supervision, all of which should be carried as part of the Contract Sum.~~

...

~~.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~~ .2 The Architect shall create and process Allowance Access Authorizations for the Construction

...

~~and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.~~ Manager and Owner's approval and execution in accordance with the Contract Documents.

...

§ 3.8.3 3.8.2 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

...

§ 3.9.1 The Contractor shall employ and designate 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. The superintendent shall be in attendance at the Project site full time throughout the work, including the completion of the punch list.

PAGE 11

The Contractor shall maintain and 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~~ submittals in good order and condition. 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.

PAGE 13

§ 3.13.3 The Contractor shall be responsible for enforcing the Owner's security and access policies and procedures, the Owner's Code of Conduct, and the following rules of conduct for its personnel and those of its subcontractors, sub-subcontractors, and suppliers at the Project site, and the Owner's Project Representative shall provide interpretations should a question arise if the rules of conduct are being adequately enforced by the Contractor:

...

.1 No smoking or use of tobacco products.

...

.2 No drinking of alcoholic beverages or use of controlled substances.

...

.3 No working, or presence on site, under the influence of alcoholic beverages or controlled substances.

...

.4 No use of indecent language or display of indecent images, publications or terms.

...

.5 No use of radios or other entertainment devices.

...

.6 No horseplay or dangerous behavior.

...

.7 No firearms or other weapons.

...

Note to Specifier: Retain the following subparagraph for a school project.

...

.8 No communication with staff or students.

...

§ 3.13.4 The Contractor shall require its personnel and those of its subcontractors, sub-subcontractors and suppliers

...

to wear visible photo-identification badges acceptable to the Owner, at all times for identification and security

...

purposes.

PAGE 14

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall defend, 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 each of their consultant's, officers, board members, agents, and employees from and against any suits, claims, damages, losses, or expenses, including but not limited to attorneys' fees, fees and litigation costs, 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), suit, claim, damage, loss or expense is attributable to any bodily injury, sickness, disease, or death, or injury to or destruction of any tangible property, including loss of use resulting therefrom, but only to the extent caused by the negligent acts or omissions of the Contractor, a in whole or in part by the act, omission, fault, breach of contract, breach of warranty or statutory violation of the Contractor, a subcontractor, or any person or entity directly or indirectly employed by them, or any person or entity for whose acts they may be liable or arises out of operation of law as a consequence of any act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts they any of the above 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 any of them has been negligent.

...

§ 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 insurance policies, workers' compensation acts, disability benefit acts, or other employee benefit acts.

PAGE 15

§ 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 other, and the Owner, in writing 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.

PAGE 16

§ 4.2.13 The Construction Manager will prepare Change Orders and Contractor, in coordination with the Architect, will prepare Construction Change Directives.

...

§ 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. Intentionally Omitted.

PAGE 17

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify but no later than fourteen (14) days prior to the start of construction, shall furnish in writing to 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.

...

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 including, but not limited to,~~ the responsibility for safety of the Subcontractor's Work, ~~that and obligations to defend and indemnify~~ 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.

PAGE 18

§ 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 Architect, in writing and in detail, any 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 construction..~~

PAGE 19

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

PAGE 20

~~.3~~ Rental costs of machinery and equipment, exclusive of hand ~~tools~~, tools and equipment normally encumbered to perform the work, whether rented from the Contractor or others; and

...

~~.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.

...

.5 Overhead and profit mark-up shall include, but not be limited to, the following:

...

.1 home office expenses;

...

.2 field office expenses;

...

.3 supervision;

...

.4 project management & estimation; and

...

.5 small tolls & equipment.

PAGE 21

§ 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. The date of commencement of the Work shall not be changed by the effective date of such insurance.

...

§ 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 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. Extensions of time must be requested by the Contractor in writing, and shall only be considered after the Contractor has made reasonable efforts, at no cost to the Owner, to recover the lost time.

PAGE 22

~~Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the~~ 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.

...

§ 9.3.1.4 When the work or major portions thereof as contemplated by the terms of the Contract are substantially complete, the Contractor shall submit to the Construction Manager and Architect a requisition for payment of the remaining amount of the Contract balance. Upon receipt of such requisition, the Owner shall approve and promptly pay the remaining amount of the Contract less two times the value of any remaining items to be completed and an amount necessary to satisfy any claims, liens or judgments against the Contractor, which have not been suitably discharged, as determined by the Architect in conjunction with the Construction Manager. Any claims, liens or judgments referred to in this clause shall pertain to the Project and shall be filed in accordance with the terms of the Contract, and applicable laws.

...

§ 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-Work~~, provided the Owner has authorized such delivery and storage of materials at the site in advance. 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. The Owner shall have the right, at any time on reasonable notice to inspect materials and equipment which have been stored off the site in accordance with this paragraph.

...

§ 9.3.2.1 Proof of insurance for items stored off site and copies of invoices are to be provided with Applications for Payment requesting payment for stored materials.

PAGE 24

- .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; or

...

- .8 failure of Contractor to provide executed supplementary bid forms, performance and payment bonds or a current Certificate of Insurance.

PAGE 25

~~§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the~~ 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~~ Intentionally Omitted

...

§ 9.8 Substantial Completion

...

~~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~~ § 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.

...

~~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.~~ § 9.8.1.1 No later than 14 days prior to the Contract-scheduled date of Substantial Completion, the Contractor shall issue a letter to the Architect and Construction Manager confirming their work is on schedule for

...

§ 9.8 Substantial Completion

...

§ 9.8.1 Substantial Completion is the stage in the progress of Completion by the contract specified date. No later than seven days after Contract-scheduled date of Substantial

...

the Work when the Completion (including authorized adjustments), the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. Absent the Contractor letter confirming readiness of

...

work, the Architect may elect to postpone the substantial completion inspection. If the Architect's inspection

...

discloses any item which is not sufficiently complete in accordance with the Contract Documents so the Owner that the Owner can occupy or utilize the Work for its intended use or designated portion thereof for its intended use, the Contractor shall, before

...

issuance of 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 to determine the

...

actual date of Substantial Completion.

...

§ 9.8.3 Upon receipt of the Contractor's punch 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 punch 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.

PAGE 26

§ 9.8.6 In the event the Contractor does not achieve final completion within sixty (60) days after the date of Substantial Completion, allowing for any approved extensions of the Contract time, Contractor shall not be entitled to any further payment and Contractor agrees that such failure to complete the work within the time set forth above shall constitute a waiver of all claims by the Contractor to any money that may be due. This provision shall not operate as a waiver by the Owner of any claims or remedies of any nature against the Contractor arising out of the Contract.

PAGE 27

§ 9.10.6 If the Contractor is responsible for delays in the final completion and closeout beyond the contract specified

...

time, the Owner shall be entitled to reimbursement from the Contractor for amounts paid by the Owner to subsequently extend the Electronic Submittal System (Submittal

...

ARTICLE Exchange).

...

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

PAGE 28

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, written 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.

PAGE 29

§ 10.3.2 Upon receipt of the Contractor's written 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 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.~~Intentionally omitted.

...

~~§ 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.~~

...

§ 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. The required insurance will, at a minimum, protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be held legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any one of them, or by anyone for whose acts any of them may be liable:

...

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed, including private entities performing Work at the site and exempt from the coverage on account of the number of employees or occupation, such entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;

...

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees or persons or entities excluded by statute from the requirements of Clause 11.1.1.1, but required by the Clause;

PAGE 30

.3 Claims for damages because of bodily injury, occupational sickness or disease, or death of any person other than the Contractor's employees;

...

.4 Claims for damages insured by usual personal injury liability coverage; which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;

...

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

...

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

...

.7 Claims for bodily injury or property damage arising out of completed operations;

...

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

...

§ 11.1.4 The required insurance shall meet the minimum requirements set forth in the Rider attached to AIA Document A132-2019, Exhibit A regarding insurance requirements , and elsewhere in the Contract Documents.

...

§ 11.1.5 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.

...

§ 11.2.2 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 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.~~

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§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within ~~three (3)~~ seven (7) 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.

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§ 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.

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The Contract shall be governed by the law of the place where the Project is ~~located~~ excluding-located. The parties expressly agree that any claim, dispute or other controversy of any nature arising out of the Contract or performance of the Work shall be commenced and maintained in Supreme Court, Rockland County, or the United State District Court, Southern District of New York, if applicable.

...
§ 13.1.2 The Contractor shall at all times observe and comply with all Federal and State Laws, and all Laws, Ordinances and Regulations of the Owner, in any manner affecting the work, and all such orders decreed as exist at present and those which may be enacted later, by bodies or tribunals having jurisdiction or authority over the Work, and the Contractor shall defend, indemnify and save harmless the Owner, Construction Manager and Architect and all their officers, agents or servants against any claim or liability arising from, or based on, a violation of any such law, ordinances, regulation or order, whether by himself or by his employee or agents.

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

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

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

...
.3 The minimum hourly rate of wages to be paid shall not be less than that stated in the Specifications, and any re-determination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of this Contract. The Labor Law provides that the Contract may be forfeited and no sum paid for any work done thereunder on a second conviction of willfully paying less than:

- ...
1. the stipulated wage scale as provided in Labor Law, Section 220, Sub-division 3, as amended; or
1. the stipulated minimum hourly wage scale as provided in Labor Law, 220-d, as amended.

§ 13.1.4 The Contractor specifically agrees as required by the provisions of Labor Law, Section 220-e, as amended that:

...

.1 In hiring of employees for the performance of work under this Contract or any subcontract hereunder or for the manufacture, sale, or distribution of materials, equipment or supplies, hereunder, no Contractor or Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, disability, sex, or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.

...

.2 No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee under this Contract on account of race, creed, color, disability, sex, or national origin.

...

.3 There may be deducted from the amount payable to the Contractor by the Owner under this Contract, a penalty of fifty dollars (\$50) for each person for each calendar day during which such a person was discriminated against or intimidated in violation of the provisions of the Contract, and

...

.4 The provisions of this section covering every Contract for or on behalf of the Owner, the State or a municipality for the manufacture or sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

...

§ 13.1.5 During the performance of this Contract, the Contractor agrees as follows:

...

.1 The Contractor will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.

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~~that jurisdiction's choice.~~ .2 If directed to do so by the Owner or the State Commissioner of Human Rights, the Contractor will send to each labor union or representative of workers which with the Contractor has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commissioner of Human Rights, advising such labor union or representative of the Contractor's agreement under clauses (1) through (6) (hereinafter called "non-discrimination clauses"). If the Contractor was directed to do so by the Owner as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish a written statement that such a labor union representative will not discriminate because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, or marital status, and that such labor union or representative will cooperate, within the limits of its legal contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses and that it consents and agrees that the recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provision of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a

request that it furnish such a statement, the Contractor shall promptly notify the Owner and the State Commissioner of Human Rights of such failure or refusal.

...

.3 If directed to do so by the Owner or the Commissioner of Human Rights, the Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commissioner of Human Rights setting forth the substance of provisions of clauses (1) and (2) and such provision of law rules, the State's law against discrimination as the State Commissioner of Human Rights shall determine.

...

.4 The Contractor will state in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of age, race, creed, color, national origin, sexual orientation, military status, sex, disability, predisposing genetic characteristics, marital status, or domestic violence victim status.

...

.5 The Contractor will comply with the provisions of Sections 290-299 of the Executive Law, and with the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these non-discrimination clauses and such section of the Executive Law, and will permit access to the Contractor's books, records, and accounts by the Owner, the State Commissioner of Human Rights, the Attorney General and the Industrial Commissioner for the purposes of investigation to ascertain compliance with the non-discrimination clauses and such sections of the Executive Law Civil Rights Law.

...

.6 This Contract may be forthwith cancelled, terminated or suspended, in whole or in part, by the Owner upon the basis of a finding made by the State Commissioner of Human Rights that the Contractor has not complied with the non-discrimination clauses, and that the Contractor may be declared ineligible for future contracts made by or on behalf of the Owner, the State or a public authority or agency of the State, until the Contractor satisfies the State Commissioner of Human Rights that the Contractor has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings may be made by the State Commissioner of the Human Rights after conciliation efforts by the Commissioner have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commissioner, notice thereof has been given to the Contractor to be heard publicly in accordance with the Executive Law. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law, and

...

If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4. .7 The Contractor will include the provisions of clauses .1 through .6 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 action in enforcing such provisions of such subcontract or purchase order as the State Commissioner of Human Rights or the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved or is threatened with litigation with a subcontractor or vendor as a result of such directions by the State Commissioner of Human Rights or the Owner, the Contractor shall promptly so notify the Owner and the Attorney General requesting the Attorney General to intervene and protect the interests of the State of New York.

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Payments due to Contractor, including any interest, shall be consistent with this Agreement and in accordance with New York State General Municipal Law Section 106-b.

...

13.6 Equal Opportunity

...

§ 13.6.1 The Contractor shall maintain policies of employment as follows:

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~~and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate of 1%~~ The Contractor and the Contractor's subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notice setting forth the policies of non-discrimination.

...

~~the parties agree upon in writing or, in the absence thereof, at the rate of 1%~~ 2 The Contractor and the Contractor's subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

...

§ 13.7 Wage Rates

...

~~the absence thereof, at the rate of 1%~~ § 13.7.1 The Contractor shall comply with Prevailing Wage Rates issued and periodically updated, by the New York

...

the legal rate prevailing from time to time at the place where the Project is located, State Department of Labor, for the location and duration of the Project.

...

- 2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

...

- .3 Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, 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, under direct or indirect contract with the Contractor, 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, thirty (30) days' written notice to the Owner with reasonable opportunity to cure, 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 properly executed.~~

...

§ 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~~ thirty (30) 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.

...

- .1 ~~repeatedly~~-refuses or fails to supply enough properly skilled workers or proper materials;

...

- .3 ~~repeatedly~~-disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

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- .4 ~~otherwise is guilty of substantial breach~~ breaches a material provision of the Contract Documents;

...

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

...

~~of a provision.~~ .6 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all of the requirements 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:

...

- .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. The costs of finishing the Work include, without limitations, all reasonable attorney's fees incurred by the Owner, additional Architect/Engineering and Construction Manager costs, insurance, additional interest because of any delay in completing the Work.

...

§ 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.~~

...

§ 14.3.2 The Contract Sum and the Contract Time ~~shall may~~ 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:

...

§ 14.4.1 ~~The Owner may, at any time, terminate the Contract.~~ Notwithstanding any other provision to the contrary in this Agreement, the Owner reserves the right at any time and in its absolute discretion to terminate the services of the Contractor and/or the Work for the Owner's convenience and without cause by giving written notice to the Contractor. This termination for the convenience of the Owner provision allows and authorizes the Owner to terminate this Agreement at any time and for any reason whatsoever. This right may be exercised by the Owner in its complete discretion.

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§ 14.4.3 ~~In the 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. the Contractor shall be entitled to, and the Owner shall reimburse the Contractor for, an equitable portion of the Contractor's fee based on the portion of the Work properly completed before the effective date of termination. Contractor's entitlement to payment for all such work shall be predicated on its performance of such work in accordance with the Contract Documents as certified by the Architect and Construction Manager. Contractor shall be entitled to no other payment and waives any claim for damages.~~

...

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 law.~~

...

§ 15.1.2.1 Claims by the Contractor must be made by written notice in accordance with the following procedures.

...

~~in any case not more than 10 years after.~~ 1 the Contractor may submit a claim concerning a matter properly noticed in accordance with the time requirements of this Contract set forth in paragraph 15.1.2 and elsewhere;

...

~~the date of Substantial Completion.~~ 2 failure by the Contractor to furnish the required claim documentation within the time set forth above shall constitute waiver of the Contractor's right to compensation for such claim.

...

~~of the Work. The Owner.~~ 3 Contractor shall furnish three (3) certified copies of the required claim documentation. The claim documentation shall be complete when furnished. The evaluation of the Contractor's claim will be based, among other things, upon the Owner's Project Records and the Contractor's furnished claim documentation

...

.4 claim documentation shall conform to Generally Accepted Accounting Principles and shall be in the following format:

1. general introduction;
2. general background discussion
3. issues
 1. index of issues (listed numerically);
 2. for each issue:
 1. background
 2. chronology
 3. Contractor's position (reason for Owner's potential liability)
 4. supporting documentation of merit or entitlement
 5. supporting documentation of damages
 6. begin each issue on a new page
4. all critical path method schedules (as-planned, monthly updates, schedule revisions and as-built, along with computer disks of all schedules related to the claim;
5. productivity exhibits (if appropriate); and
6. summary of issues and damages.

...

~~and Contractor waive all Claims.~~ 5 supporting documentation of merit for each issue shall be cited by reference, photocopies or explanation. Supporting documentation may include, but shall not be limited to General Conditions, General Requirements, technical specifications, drawings, correspondence, conference notes, shop drawings and submittals, shop drawing logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary CPM schedules or time impact analyses, photographs, technical reports, requests for information, field instructions and all other related records necessary to support the Contractor's claim.

~~and causes.~~ 6 supporting documentation of damages for each issue shall be cited, photocopied or explained. Supporting documentation may include, but shall not be limited to, any or all documents related to the preparation and submission of the bid; certified, detailed labor records including labor distribution reports; material and equipment procurement records; construction equipment ownership, cost records or rental records; subcontractor or vendor files and cost records; service cost records; purchase orders; invoices; Project as-planned and as-built cost records; general ledger records; variance reports; accounting adjustment records, and any other accounting material necessary to support the Contractor's claims.

...

~~of action not commenced in accordance with this Section 15.1.2.~~ 7 each copy of the claim documentation shall be certified by a responsible officer of the Contractor in accordance with the requirements of these Contract Documents.

...

§ 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 on non-disputed items in accordance with the Contract Documents.

...

§ 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.

...

§ 15.1.7 Waiver of Claims for Consequential Damages. The Contractor ~~and Owner waive Claims against each other~~ waives Claims for consequential damages arising out of or relating to this Contract. This ~~mutual~~ waiver includes

...

- ~~.1~~ 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~~ 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.

§ 15.2.5 ~~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 If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Architect, the Architect will render to the parties the Architect's written recommendation relative to the Claim, including any recommended 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. If there is a surety and there appears to be a possibility of a Contractor's default, the Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

...

§ 15.2.6.1 Either party may, within ~~30~~thirty (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 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.~~mediate.

...

§ 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.~~Intentionally omitted.

...

§ 15.3.2 The parties ~~shall~~may 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.~~

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§ 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.

...

~~§ 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.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Michael Shilale, AIA, LEED, CPHC, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:41:01 ET on 12/01/2023 under Order No. 4104241495 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A232™ - 2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 008100 - MODIFICATIONS TO GENERAL CONDITIONS

GENERAL

- A. AIA Document A232, 2019 Edition, "General Conditions of the Contract for Construction, Construction Manager as Adviser Edition", shall be considered an incorporated portion of Contract, and its provisions, unless specifically indicated to be omitted, shall determine all questions which may arise concerning adjudication of disputes or other matters covered therein having relation to Contracts between Owner and Contractor.
- B. Where any Article of AIA Document A232, 2019 Edition, is modified by alteration, addition or deletion, provisions of such Article shall remain in effect. All modifications shall be considered as added thereto. Where any such Article is amended, voided or superseded thereby, provisions of such Article not so specifically amended, voided or superseded shall remain in effect. Wherever a conflict exists between the Modifications to the General Conditions and any article of AIA Document 232, 2019 the provision of these Modifications shall prevail.
- C. Where provisions of "General Conditions of the Contract for Construction, Construction Manager as Adviser Edition" relate to Project administrative or work-related requirements of the Contract, those provisions (including, but not limited to, allowances, progress schedule, submittal procedure, temporary facilities, cutting and patching, record drawings and clean-up) are specified in Division 1-General Requirements if required.

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

- (A) "Owner" (Article 2, General Conditions)
 - (B) "Architect" (Article 2, General Conditions) is Michael Shilale Architects, LLP, 140 Park Ave., New City, NY 10956.
 - (c) "General Contractor" (Article 3, General Conditions) is contractor having direct contract with Owner.
 - (d) "Contractor" (Article 3, General Conditions) is either General Contractor or Subcontractor having direct contract with General Contractor.
 - (e) "Other Contractor" is contractor having contract with Owner for work not herein specified.
 - (f) The Contractor shall allow the Owner or anyone employed by him, directly or indirectly, whether Union or non-Union, in the building and on the premises at all times.
 - (g) The term "Furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - (h) The term "Install" is used to describe operations at Project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
- A. Add the following sentence to Subparagraph 1.1.1:
 - a. The Contract Documents executed or identified in accordance with Subparagraph 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulated electronic operations involving computers.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

- A. Add clause 1.2.1.2 to Subparagraph 1.2.1:

1.2.1.2 In the event of conflicts or discrepancies among the contract documents, interpretations will be based on the following priorities:

1. Modifications
2. The Agreement
3. Addenda, with those of later date having precedence over those of an earlier date.
4. The supplementary conditions.
5. The General Conditions of contract for construction.
6. Division 1 of the specifications.
7. Drawings and divisions 2-33 of the specifications.
8. Other documents specifically enumerated in the agreements as part of the contract documents.

In the case of conflicts or discrepancies between drawings and divisions 2-33 of the specifications or within either document not clarified by addendum, the Architect will determine which takes precedence in accordance with Subparagraph 4.2.11, 4.2.12, and 4.2.13.

- B. Add the following clause to section 1.7:
PDF files may be provided to contractor.
- C. Delete section 1.8 and substitute to following:
Building Information Models will not be provided.

ARTICLE 2 - OWNER

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

- A. Delete Subparagraph 2.3.7 and substitute the following:
2.3.7 The Contractor will be furnished, free of charge two (2) copies of drawings and Project manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- A. Add the following Subparagraph 3.2.4.1 to section 3.2.4:
3.2.4.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents to where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

3.4 LABOR AND MATERIALS

- A. Add section 3.4.2.1 to section 3.4.2:
3.4.2.1 After the Contract has been executed, the Owner and Architect will consider requests for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:
1. represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 2. represents that it will provide the same warranty for the substitution as it would have provided for the product specified.
 3. certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent; and
 4. shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

- B. Add the following to the end of section 3.4.2:
3.4.2.2 The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications resulting from such substitutions.

3.6 TAXES

- A. Add section 3.6.1 to section 3.6:
The Owner is a School District, and is therefore exempt from sales tax. Sales tax is not to be included in the bids. This exemption does not, however, apply to tools, machinery, equipment, or other property leased by, or to the Contractor or a subcontractor; and the Contractor and its subcontractor shall be responsible for, and pay, any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

- A. Add subparagraph 3.11.1 as follows: "For additional requirements refer to Specification Section 017839 - PROJECT RECORD DOCUMENTS. Reference to 3.11 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Add section 3.12.11 to section 3.12:
3.12.11 The Contractor is required to provide all submittals for the Architect's review, in accordance with the submittal deadlines noted in the Contract Documents. The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals, and for evaluation of submittals received after the applicable deadline in the Contract Documents.
- B. Add section 3.12.12 to section 3.12:
3.12.12 "For additional requirements refer to Specification Section 013300 – SUBMITTAL PROCEDURES. Reference to 3.12 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.14 CUTTING AND PATCHING

- A. Add subparagraph 3.14.3 as follows: "For additional requirements refer to Specification Section 024119 – SELECTIVE DEMOLITION. Reference to 3.14 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

3.15 CLEANING UP

- A. Add subparagraph 3.15.3 as follows: "For additional requirements refer to Specification Section 017419 - CONSTRUCTION WASTE MANAGEMENT and 017700 – CLOSEOUT PROCEDURES. Reference to 3.15 elsewhere in the Contract Documents shall read as referring to that section of the Specification."

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

- A. Add the following subparagraph 4.2.2.1:
4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect and/or the Construction Manager for site visits made necessary by the fault or neglect of the Contractor or by defects and

deficiencies in the Work.

- B. Add the following subparagraph 4.2.14.1:
4.2.14.1 Contractor's requests for information shall be prepared and submitted in accordance with Division 1 "General Requirements" sections on the form included in the Contract Documents [OR] on AIA Document G716-2004. The Architect will return without action requests for information that do not conform to requirements for the Contract Documents.

ARTICLE 5 - SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTORS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

- A. Add section 5.2.5 to section 5.2:

5.2.5 MANUFACTURERS AND FABRICATORS

5.2.5.1 Not later than thirty (30) days after the date of commencement of the Work, the Contractor shall furnish in writing to the Owner through the Architect the names of the persons or entities proposed as manufactures or fabricators for certain products, equipment and systems identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the name of the installing Subcontractor. The Architect may reply within 14 days to the Contractor in writing stating 1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or 2) that the Architect requires additional time to review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

5.2.5.2 The Contractor shall not contract with a proposed person or entity to whom the Owner 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.

5.2.5.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected manufacturer or fabricator 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 manufacturer's or fabricator'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.

5.2.5.4 The Contractor shall not substitute a person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

ARTICLE 7 - CHANGES IN THE WORK

7.1 GENERAL

- A. Add the following Subparagraph 7.1.4 to Paragraph 7.1:
7.1.4 The combined overhead and profit included in the total cost to the Owner of a change in the work shall be based on the following schedule:
1. For the Contractor, for Work performed by the Contractor's own forces, 15 percent of the cost.
 2. For the Contractor, for Work performed by the Contractor's Subcontractor 7 percent of the amount due to the Subcontractor.
 3. For each Subcontractor involved, for work performed by that subcontractor's own forces, 7 percent of the cost.
 4. for each Subcontractor, for Work performed by the Subcontractor's sub-subcontractor, 7 percent of the amount due the sub-subcontractor.
 5. Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.7.

6. In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and Materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over \$500.00 be approved without such itemization.

.2 CHANGE ORDERS

- A. Delete Subparagraph 7.2.1 and substitute as follows:

7.2.1 A Change Order is a written instrument prepared by the Contractor and signed by the Owner, Construction Manager, Contractor, and Architect 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.

ARTICLE 8 - TIME

8.3 DELAYS AND EXTENSIONS OF TIME

Delete paragraph 8.3.1 and substitute as follows:

“8.3.1 If the Contractor is delayed at any time in the progress of the work by such causes which the Architect determines justifies the delay, the Contract time shall be extended by Change Order for such reasonable time as the Architect may determine. The Contractor agrees to make no claim against the Owner, Construction Manager or the Architect, Architect’s Consultants or Architect’s Subcontractors, for damages for delay in the performance of this contract occasioned by any act or omission of the Owner or any of its representatives, or the Construction Manager, Architect, Architect’s Consultants or Architect’s Subcontractors, and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein. The delays contemplated by this paragraph include, but are not limited to, loss or damage arising out of, or related to, any unforeseen obstructions or difficulties which may be encountered during the performance of the contract, including damages which may be caused or occasioned by the contractor’s reliance upon such records, reports or information furnished by the Owner, Construction Manager or Architect or Architect’s Consultants or Architect’s Subcontractors. An extension of time to complete performance is an equitable adjustment as contemplated by paragraph 14.3.2 of the General Conditions of the contract. When the act or omission of another contractor causes delays resulting in damage to the Contractor, the Contractor damaged thereby must proceed against the offending contractor and shall make no claim against the Owner, Construction Manager or Architect or Architect’s Consultants or Architect’s Subcontractors.”

IT IS EMPHASIZED THAT NO MONETARY RECOVERY MAY BE OBTAINED BY THE CONTRACTOR FOR DELAY AGAINST THE OWNER, CONSTRUCTION MANAGER, OR ARCHITECT BASED ON ANY REASON AND THAT THE CONTRACTOR'S SOLE REMEDY, IF APPROPRIATE, IS ADDITIONAL TIME.”

8.3.2 Delete in its entirety.

8.3.3 Delete the words “either party” in line 2 and replace with the words “the Owner.”

ARTICLE 9 - PAYMENT AND COMPLETION

9.3 APPLICATION FOR PAYMENTS

- A. 9.3.1 Add the following sentence to the end of Subparagraph 9.3.1:

The form of Application for Payment, duly notarized, shall be current authorized edition of AIA Document G702-1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703-1992, Continuation Sheet.

- B. Add the following clause 9.3.1.3 to Subparagraph 9.3.1:
9.3.1.3 Until the work is ninety (90%) percent complete, the Owner shall pay ninety (~~90%~~) percent of the amount due the Contractor on the account of progress payments. At the time of Work is 90 percent complete and thereafter, the Owner shall pay ninety-five (95%) percent of the amount due to the Contractor until punch list completion, subject however to the provisions of Article 5 of AIA Document A132-2019.

9.6 To subparagraph 9.6.1 add the following:

- A. "Certificates for Payment shall be issued monthly if work is progressing satisfactorily and if application for payment has been submitted

9.8 SUBSTANTIAL COMPLETION

- A. Add section 9.8.3.1 after 9.8.3
9.8.3.1 The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.
- B. Add to section 9.8.5: In no event shall the outstanding amount be less than two hundred (200%) percent of the value of the incomplete Work and unsettled claims.

9.10 FINAL COMPLETION AND FINAL PAYMENT

- A. Add the following section 9.10.1.1 to section 9.10.1:
9.10.1.1 The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.
- B. To subparagraph 9.10.2 add the following: "Upon demand by the Owner, Contractor shall provide and file bond for discharge of any lien, as required by Lien Law, State of New York, Section 21, Paragraph 5."

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

- A. No Modifications

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

- A. No Modifications

ARTICLE 15 – CLAIMS AND DISPUTES

- A. Add the following Sections 15.1.6.3 and 15.1.6.4 to Section 15.1.6:

15.1.6.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction

schedule indication all the activities affected by the circumstances forming the basis of the Claim.

15.1.6.4. The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

END OF SECTION 008100

SECTION 008150 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS

1.01

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

1.02 Indication that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and asbestos. Note, the project folder should contain a letter regarding the presence of asbestos.

1.03:

"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."

1.04

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

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

1.05 A plan detailing how exiting required by the applicable building code will be maintained work for this project will be completed while school not in session.

1.06 A plan detailing how adequate ventilation will be maintained during construction work for this project will be completed while school is not in session.

1.07:

"Construction and maintenance operations shall not produce noise in excess of 60 d.b.a. 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."

1.08:

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

1.09:

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

1.10:

"Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied".
Note, It is our interpretation that 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.

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.

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

WAGE RATE REQUIREMENTS

1. As required by Wickes Law, all contractors and sub-contractors on construction work must pay wages that are equal to, or greater than, the prevailing wage rates determined by the federal government. A copy of the said rates is attached to the specifications herein. Contractors and sub-contractors will be required to submit weekly payroll records certifying actual wages paid.
 - A. 008310 Prevailing Wage Rates for HS Chiller Replacement & HVAC Upgrades



Kathy Hochul, Governor

Roberta Reardon, Commissioner

North Rockland Central School

John Cirilli
140 Park Avenue
New City NY 10956

Schedule Year 2023 through 2024
Date Requested 02/14/2024
PRC# 2024001897

Location North Rockland High School
Project ID# 43065
Project Type Chiller replacement and HVAC upgrades.

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

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

The schedule is effective from July 2023 through June 2024. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

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

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

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

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

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.

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 from 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, contemporaneous, 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.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

North Rockland Central School

John Cirilli
140 Park Avenue
New City NY 10956

Schedule Year 2023 through 2024
Date Requested 02/14/2024
PRC# 2024001897

Location North Rockland High School
Project ID# 43065
Project Type Chiller replacement and HVAC upgrades.

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

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.

**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

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.



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)



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 or 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 requirements 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 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.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than 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.

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

Rockland County General Construction

Boilermaker

02/01/2024

JOB DESCRIPTION Boilermaker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2023	01/01/2024
Boilermaker	\$ 65.88	\$ 67.38
Repairs & Renovations	65.88	67.38

Repairs & Renovation: Includes Repairing, Renovating replacement of parts to an existing unit(s).

SUPPLEMENTAL BENEFITS

Per Hour:

Boilermaker	33.5% of hourly	33.5% of Hourly
Repair \$ Renovations	Wage Paid	Wage Paid
	+ \$ 26.49	+ \$26.85

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY

See (*B, O, **U) on OVERTIME PAGE

Note:* Includes 9th & 10th hours, double for 11th or more.

** Labor Day ONLY, if worked.

Repairs & Renovation see (B,E,Q) on OT Page

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 12, 15, 25, 26, 29) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s)	33.5% of Hourly Wage Paid Plus Amount Below	33.5% of Hourly Wage Paid Plus Amount Below
1st Term	\$ 20.12	\$ 20.36
2nd Term	21.03	21.28
3rd Term	21.95	22.22
4th Term	22.83	23.12
5th Term	23.76	24.07
6th Term	24.67	25.00
7th Term	25.58	25.93

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Piledriver	\$ 59.16 + 9.79*
Dockbuilder	\$ 59.16 + 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 45.34
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OVERTIME PAY

See (B, E2, O) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$25.60	\$31.20	\$39.58	\$47.97
+ 5.30*	+ 5.30*	+ 5.30*	+ 5.30*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All Terms: \$ 31.83

8-1556 Db

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Carpet/Resilient Floor Coverer	\$ 55.05 + 8.25*
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*This portion is not subject to overtime premiums

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 39.45

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wage per hour - (1) year terms:

1st	2nd	3rd	4th
\$ 25.20	\$ 28.20	\$ 32.45	\$ 40.33

+ 1.85* + 2.35* + 2.85* + 3.85*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 15.22	\$ 16.22	\$ 19.32	\$ 20.32

8-2287

Carpenter**02/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Marine Construction:

Marine Diver \$ 74.03
 + 9.79*

Marine Tender \$ 53.57
 + 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 45.34

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 13, 16, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms.

1st year	\$ 25.60 + 5.30*
2nd year	31.20 + 5.30*
3rd year	39.58 + 5.30*
4th year	47.97 + 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits

Per Hour:

All terms \$ 31.83

8-1456MC

Carpenter**02/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Building
Millwright \$ 58.70
 + 12.62*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 44.31

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$31.74	\$37.19	\$42.64	\$53.54
+ 6.75*	+ 7.92*	+ 9.09*	+ 11.43*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$29.81	\$32.34	\$35.52	\$39.94

8-740.1

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES

Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.

Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.

Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour: 07/01/2023

Core Drilling:

Driller \$ 43.88
 + 2.50*

Driller Helper

\$ 34.47
+ 2.50*

Note: Hazardous Waste Pay Differential:

For Level C, an additional 15% above wage rate per hour

For Level B, an additional 15% above wage rate per hour

For Level A, an additional 15% above wage rate per hour

Note: When required to work on water: an additional \$ 3.00 per hour.

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Driller and Helper \$ 28.85

OVERTIME PAY

See (B, G, P) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway

02/01/2024

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

WAGES

WAGES:(per hour)

Applies to CAPRENTER BUILDING/HEAVY & HIGHWAY/TUNNEL:

	07/01/2023	07/01/2024	07/01/2025	07/01/2026
		Additional	Additional	Additional
Base Wage	\$ 39.80	\$ 1.25**	\$ 1.25**	\$ 1.25**
	+\$6.71*			

*For all hours paid straight or premium.

**To be allocated at a later date.

SHIFT DIFFERENTIAL: When it is mandated by a Government Agency irregular or off shift can be worked. The Carpenter shall receive an additional fifteen percent (15%) of wage plus applicable benefits.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 33.22

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

BUILDING:

Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.

- Holidays that fall on Sunday will be observed Monday.

HEAVY&HIGHWAY/TUNNEL:

Paid: See (5, 6, 25) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

- Holidays that fall on Sunday will be observed Monday

- Must be employed during the five (5) work days immediately preceding a holiday or during the five (5) work days following the paid holiday to receive holiday pay

- If Employee is entitled to a paid holiday, the Employee is paid the Holiday wage and supplemental benefits whether they work or not. If Employee works the Holiday, the Employee will receive holiday pay (including supplemental benefits), plus the applicable premium wage for working the Holiday. If Employee works in excess of 8 hours on Holiday, then benefits will be paid for any hours in excess of 8 hours.

REGISTERED APPRENTICES

1 year terms at the following wage rates:

1st	2nd	3rd	4th	5th
\$ 19.90	\$ 23.88	\$ 25.87	\$ 27.86	\$ 31.84
+3.58*	+3.58*	+3.58*	+3.58*	+3.58*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms \$ 16.27

11-279.1B/HH

Electrician

02/01/2024

JOB DESCRIPTION Electrician

DISTRICT 11

ENTIRE COUNTIES

Orange, Putnam, Rockland

PARTIAL COUNTIES

Dutchess: Towns of Fishkill, East Fishkill, and Beacon.

WAGES

Per hour:

	07/01/2023	04/01/2024
Electrician Wireman/Technician	\$ 49.50 +9.00*	\$ 50.50 + 9.50*

SHIFT DIFFERENTIAL: On Public Work in New York State when shift work is mandated either in the job specifications or by the contracting agency, the following rates apply when shift is worked:

Between 4:30pm & 12:30am	\$ 58.08 + 9.00*	\$ 59.30 + 9.50*
Between 12:30am & 8:30am	\$ 65.06 + 9.00*	\$66.35 + 9.50*

*For all hours paid straight or premium, not to be included in 3% calculation for supplemental benefits.

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (subject to overtime premiums):

- On jobs where employees are required to work from boatswain chairs, swinging scaffolds, etc., forty (40) feet or more above the ground, or under compressed air, using Scottair packs, or gas masks, they shall receive an additional \$2.00 per hour above the regular straight time rate.
- Journeyman Wireman working in Shafts, Tunnels or on Barges: \$5.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman when performing welding or cable splicing: \$3.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman required to have a NYS Asbestos Certificate: \$3.00 above the Journeyman Wireman rate of pay
- Journeyman Wireman required to have a CDL: \$3.00 above the Journeyman Wireman rate of pay.

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2023	04/01/2024
Journeyman	\$ 28.68 plus 3% of straight or premium wage	\$ 29.68 plus 3% of straight or premium wage

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 13, 15, 16, 25) on HOLIDAY PAGE

When the holiday falls on a Saturday it is observed the Friday before. When the holiday falls on a Sunday it is observed on the Monday after.

REGISTERED APPRENTICES

WAGES:

(1)year terms at the following rates

07/01/2023	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 14.25 +1.00*	\$ 19.00 +1.00*	\$ 23.75 +1.50*	\$ 28.50 +2.00*	\$ 33.25 +2.50*	\$ 35.63 +2.50*
2nd Shift	16.72 +1.00*	22.29 +1.00*	27.86 +1.50*	33.43 +2.00*	39.00 +2.50*	41.79 +2.50*
3rd Shift	18.72 +1.00*	24.97 +1.00*	31.21 +1.50*	37.45 +2.00*	43.69 +2.50*	46.82 +2.50*
09/01/2023	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 15.68 +1.00*	\$ 19.00 +1.00*	\$ 23.75 +1.50*	\$ 28.50 +2.00*	\$ 33.25 +2.50*	\$ 35.63 +2.50*
2nd Shift	18.39 +1.00*	22.29 +1.00*	27.86 +1.50*	33.43 +2.00*	39.00 +2.50*	41.79 +2.50*
3rd Shift	20.60 +1.00*	24.97 +1.00*	31.21 +1.50*	47.45 +2.00*	43.69 +2.50*	46.82 +2.50*
04/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.01 +1.00*	\$ 19.40 +1.00*	\$ 24.25 +1.50*	\$ 29.10 +2.00*	\$ 33.95 +2.50*	\$ 36.38 +2.50*
2nd Shift	18.78 +1.00*	22.76 +1.00*	28.45 +1.50*	34.13 +2.00*	39.82 +2.50*	42.67 +2.50*
3rd Shift	21.04 +1.00*	25.49 +1.00*	31.86 +1.50*	38.24 +2.00*	44.61 +2.50*	47.80 +2.50*
09/01/2024	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.01 +1.00*	\$ 19.40 +1.00*	\$ 24.25 +1.00*	\$ 29.10 +2.00*	\$ 33.95 +2.50*	\$ 36.38 +2.50*
2nd Shift	18.78 +1.00*	22.76 +1.00*	28.45 +1.00*	34.13 +2.00*	39.82 +2.50*	42.67 +2.50*

3rd Shift	21.04 +1.00*	25.49 +1.00*	31.86 +1.00*	38.24 +2.00*	44.61 +2.50*	47.80 +2.50*
04/01/2025	1st	2nd	3rd	4th	5th	6th
1st Shift	\$ 16.34 +1.00*	\$ 19.80 +1.00*	\$ 24.75 +1.00*	\$ 29.70 +2.00*	\$ 34.65 +2.50*	\$ 37.13 +2.50*
2nd Shift	19.17 +1.00*	23.23 +1.00*	29.03 +1.00*	34.84 +2.00*	40.64 +2.50*	43.55 +2.50*
3rd Shift	21.47 +1.00*	26.02 +1.00*	32.52 +1.00*	39.03 +2.00*	45.53 +2.50*	48.79 +2.50*

*For all hours paid straight or premium, not to be included in 3% calculation for supplemental benefits.

SUPPLEMENTAL BENEFITS per hour:

07/01/2023

1st term	\$ 16.28 plus 3% of straight or premium wage
2nd term	\$ 16.28 plus 3% of straight or premium wage
3rd term	\$ 18.28 plus 3% of straight or premium wage
4th term	\$ 18.78 plus 3% of straight or premium wage
5th term	\$ 20.28 plus 3% of straight or premium wage
6th term	\$ 20.28 plus 3% of straight or premium wage

09/01/2024

1st term	\$ 16.28 plus 3% of straight or premium wage
2nd term	\$ 17.78 plus 3% of straight or premium wage
3rd term	\$ 18.78 plus 3% of straight or premium wage
4th term	\$ 19.78 plus 3% of straight or premium wage
5th term	\$ 21.28 plus 3% of straight or premium wage
6th term	\$ 21.28 plus 3% of straight or premium wage

11-363/1

Elevator Constructor

02/01/2024

JOB DESCRIPTION Elevator Constructor

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per hour:

07/01/2023

Elevator Constructor \$ 77.49

Modernization &
Service/Repair \$ 60.89

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor \$ 45.574

Modernization &
Service/Repairs 44.412

OVERTIME PAY

Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, F, S) on OVERTIME PAGE.

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

*Note: 1st, 2nd, 3rd Terms are based on Average wage of Constructor & Modernization.
Terms 4 thru 9 Based on Journeyman's wage of classification Working in.

6 MONTH TERMS:

1st Term*	2nd & 3rd Term*	4th & 5th Term	6th & 7th Term	8th & 9th Term
50%	50%	55%	65%	75%

SUPPLEMENTAL BENEFITS

Elevator Constructor

1st Term	\$ 0.00
2nd & 3rd Term	36.024
4th & 5th Term	36.943
6th & 7th Term	38.448
8th & 9th Term	39.953

Modernization &
Service/Repair

1st Term	\$ 0.00
2nd & 3rd Term	35.694
4th & 5th Term	36.525
6th & 7th Term	37.948
8th & 9th Term	39.38

4-1

Elevator Constructor

02/01/2024

JOB DESCRIPTION Elevator Constructor

DISTRICT 1

ENTIRE COUNTIES

Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, Ulster

PARTIAL COUNTIES

Delaware: Towns of Andes, Bovina, Colchester, Davenport, Delhi, Harpersfield, Hemdon, Kortright, Meredith, Middletown, Roxbury, Hancock & Stamford

Rockland: Only the Township of Stony Point.

Westchester: Only the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per Hour	07/01/2023	01/01/2024
Mechanic	\$ 67.35	\$ 70.15
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour	07/01/2023	01/01/2024
Journeyperson/Helper	\$ 37.335*	\$ 37.885*

(*)Plus 6% of regular hourly if less than 5 years of service. Plus 8% of regular hourly rate if more than 5 years of service.

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

Note: When a paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES

Wages per hour:

0-6 mo*	6-12 mo	2nd yr	3rd yr	4th yr
50 %	55 %	65 %	70 %	80 %

(*)Plus 6% of the hourly rate, no additional supplemental benefits.

Supplemental Benefits per hour worked:

Same as Journeyperson/Helper

1-138

Glazier

02/01/2024

JOB DESCRIPTION Glazier

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per hour: 7/01/2023

Glazier & Glass Tinting	\$ 61.64
*Scaffolding	65.64
Window Film	
**Repair & Maintenance	30.76

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 30' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building whenever performed, where the total cumulative Repair & Maintenance contract value is under \$184,000.

SUPPLEMENTAL BENEFITS

Per hour: 7/01/2023

Glazier & Glass Tinting	\$ 40.20
Window Film	
Repair & Maintenance	23.19

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

For 'Repair & Maintenance' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE

For 'Repair & Maintenance'

Paid: See(5, 6, 16, 25)

Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:

(1) year terms at the following wage rates:

7/01/2023

1st term	\$ 21.93
2nd term	30.05
3rd term	39.95
4th term	48.97

Supplemental Benefits:

(Per hour)

1st term	\$ 18.25
2nd term	25.97
3rd term	31.27
4th term	34.32

Insulator - Heat & Frost	02/01/2024
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JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour:	07/01/2023	06/01/2024
Insulator	\$ 59.25	+ \$ 2.50
Discomfort & Additional Training**	62.31	+ \$ 2.50
Fire Stop Work*	31.77	+ \$ 2.50

* Applies on all exclusive Fire Stop Work (When contract is for Fire Stop work only). No apprentices on these contracts only.

**Applies to work requiring: garb or equipment worn against the body not customarily worn by insulators; psychological evaluation ;special training, including but not limited to "Yellow Badge" radiation training

Note: Additional \$0.50 per hour for work 30 feet or more above floor or ground level.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 37.35
Discomfort & Additional Training	39.39
Fire Stop Work: Journeyworker	19.03

OVERTIME PAY

See (B, E, E2, Q, *T) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Note: Last working day preceding Christmas and New Years day, workers shall work no later than 12:00 noon and shall receive 8 hrs pay.

Overtime: See (2*, 4, 6, 16, 25) on HOLIDAY PAGE.

*Note: Labor Day triple time if worked.

REGISTERED APPRENTICES

(1) year terms:

Insulator Apprentices:

1st	2nd	3rd	4th
\$ 31.77	\$ 37.26	\$ 42.76	\$ 48.26

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
\$ 33.30	\$ 39.09	\$ 44.90	\$ 50.71

Supplemental Benefits paid per hour:

Insulator Apprentices:

1st term	\$ 19.03
2nd term	22.69
3rd term	26.36
4th term	30.03

Discomfort & Additional Training Apprentices:

1st term	\$ 20.06
2nd term	23.92
3rd term	27.78
4th term	31.66

Ironworker	02/01/2024
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JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour: 07/01/2023

Reinforcing &
Metal Lathing \$ 56.95

"Base" Wage \$ 55.20
plus \$ 1.75

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:
Reinforcing & Metal Lathing \$ 42.72

OVERTIME PAY

See (B, E, Q, *X) on OVERTIME PAGE

*Only \$23.50 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half \$ 49.47
Double Time \$ 56.22

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 13, *18, **19, 25) on HOLIDAY PAGE

*Note: Work performed after first 4 Hours.

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

1st term	2nd term	3rd term	4th Term
Wage Per Hour: \$ 22.55	\$ 28.38	\$ 34.68	\$ 37.18
"Base" Wage \$ 21.00 plus \$1.55	\$ 26.80 plus \$1.58	\$ 33.10 plus \$1.58	\$ 35.60 plus \$1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENIFITS

Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 21.34	\$ 22.00	\$ 22.50

4-46Reinf

Ironworker	02/01/2024
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JOB DESCRIPTION Ironworker

DISTRICT 11

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster

WAGES

Per hour:	07/01/2023	07/01/2024	07/01/2025	07/01/2026
		Additional	Additional	Additional
Structural	\$ 52.63	\$ 2.00*	\$ 2.00*	\$ 2.00*
Reinforcing*	52.63	2.00*	2.00*	2.00*

Ornamental	52.63	2.00*	2.00*	2.00*
Chain Link Fence	52.63	2.00*	2.00*	2.00*

* To be allocated at a later date.

NOTE: For Reinforcing classification ONLY, Ironworker 4-46Reinf rates apply in Rockland County's southern section (south of Convent Road and east of Blue Hills Road).

On Government Mandated Irregular Work Days or Shift Work, the following wage will be paid:

1st Shift	\$ 52.63
2nd Shift	67.34
3rd Shift	72.24

**Note- Any shift that works past 12:00 midnight shall receive the 3rd shift differential.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 43.47
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OVERTIME PAY

See (B1, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16) on HOLIDAY PAGE

If a holiday falls on Saturday, it will be observed Friday. If a holiday falls on Sunday, it will be observed Monday.

REGISTERED APPRENTICES

Wages:

(1) year terms at the following wage:

	1st yr	2nd yr	3rd yr	4th yr
1st Shift	\$ 26.32	\$ 31.58	\$ 36.85	\$ 42.10
2nd Shift	36.16	42.40	48.64	54.86
3rd Shift	39.45	46.00	52.57	59.12

Supplemental Benefits per hour:

1st year	\$ 37.35
2nd year	38.57
3rd year	39.80
4th year	41.02

11-417

Laborer - Building	02/01/2024
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JOB DESCRIPTION Laborer - Building

DISTRICT 11

ENTIRE COUNTIES

Rockland

WAGES

Class 1: Custodial and janitorial work, general cleanup, and flag person.

Class 2: Concrete laborer, mason tending, hod carrier, signal person, pressure blasting and washing, chainsaw, demo saw, jackhammers, general labor.

Class 3: Jumping jack, air track drills, grading, explosive handler and blaster, grade checker. When OSHA requires negative pressure respirator.

Class 4: Environmental work including but not limited to asbestos abatement, toxic and hazardous abatement, lead abatement work, mold remediation and biohazards.

WAGES: (per hour)	07/01/2023	06/01/2024 Additional	06/01/2025 Additional	06/01/2025 Additional
Class 1	\$ 41.48	\$ 2.51*	\$ 2.60*	\$ 2.69*
Class 2	44.59	2.62*	2.71*	2.81*
Class 3	45.72	2.66*	2.75*	2.85*
Class 4	46.91	2.70*	2.80*	2.89*

*To be allocated at a later date.

SHIFT DIFFERENTIAL: On all Governmental mandated or irregular or off shift work, an additional 25% of the wage will be paid hourly.

NOTE: All work five feet or more outside the building foundation line shall be deemed Heavy & Highway

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyman	\$ 29.50
Shift Differential	\$ 36.37

OVERTIME PAY

See (B, *E, E5, **Q) on OVERTIME PAGE

*For first 8 hours on Saturday

**When an employee is required to work on a holiday which falls on a Sunday the employee shall be paid three (3) times the hourly rate and one (1) hour benefits for every hour worked. When an employee is required to work on a holiday which falls on a Saturday the employee shall be paid two and a half (2.5) times the hourly rate and one hour benefits for every hour worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

(1000) hour terms at the following wages.

	07/01/2023	06/01/2024
1st term	\$ 27.05	\$ 28.05
2nd term	31.25	32.35
3rd term	35.40	36.70
4th term	39.55	41.00

Supplemental Benefits per hour:

All Terms Regular	\$ 28.50	\$ 29.40
All Terms Shift Rate	35.12	TBD

11-754B

Laborer - Heavy&Highway

02/01/2024

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Rockland

WAGES

CLASS 1: Flagperson, gateperson.

CLASS 2: General laborer, chuck tender, nipper, powder carrier, magazine tender, concrete men, vibrator men, mason tender, mortar men, traffic control, custodial work, temporary heat, pump men, pit men, dump men, asphalt men, joint setter, signalman, pipe men, riprap, dry stone layers, jack hammer, bush hammer, pavement breaker, men on mulching & seeding machines, all seeding & sod laying, landscape work, walk behind self-propelled power saws, grinder, walk behind rollers and tampers of all types, burner men, filling and wiring of baskets for gabion walls, chain saw operator, railroad track laborers, power buggy, power brush cutter, retention liners, walk behind surface planer, chipping hammer, manhole, catch basin or inlet installing, mortar mixer, laser men. *Micropaving and crack sealing.

CLASS 3: Asbestos, toxic, bio-remediation and phyto-remediation, lead or hazardous materials abatement when certification or license is required, Drilling Equipment Only Where a Separate Air Compressor Unit Supplies Power.

CLASS 4: Asphalt screedman, blaster, all laborers involved in pipejacking and boring operations not exceeding more than 10 feet into pipe, boring or drilled area.

WAGES: (per hour)	07/01/2023	06/01/2024
		Additional
Class 1	\$ 43.75	\$ 2.25**
Class 2	47.35	2.35**
Class 3	51.65	2.45**
Class 4	55.05	4.10**

* When laborers are performing micro paving, crack sealing or slurry application when not part of asphalt prep operations laborers shall receive an additional \$2.50 per hour over rate.

** To be allocated at a later date.

SHIFT DIFFERENTIAL: Night work and irregular shift require 20% increase on wages for all Government mandated night and irregular shift work.

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 29.38
Shift Differential	34.87

OVERTIME PAY

See (B, E, P, *R, **S, ***T, X) on OVERTIME PAGE

*For Mon-Fri Holidays, Double Benefits to be paid for all hours worked.

**For Saturday Holidays, Two and one Half Benefits for all hours worked.

***For Sunday Holidays, Triple Benefits for all hours worked.

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE

To be eligible for a paid holiday, an employee must work at least two (2) days in the calendar week or payroll week in which the holiday falls.

REGISTERED APPRENTICES

(1000) hour terms at the following wages.

	07/01/2023	06/01/2024
1st term	\$ 27.05	\$ 28.05
2nd term	31.25	32.35
3rd term	35.40	36.70
4th term	39.55	41.00

Supplemental Benefits per hour:

All Terms Regular	\$ 28.50	\$ 29.40
All Terms Shift Rate	33.79	TBD

11-754H/H

Laborer - Tunnel

02/01/2024

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 11

ENTIRE COUNTIES

Columbia, Dutchess, Greene, Orange, Otsego, Putnam, Rockland, Sullivan, Ulster, Westchester

PARTIAL COUNTIES

Chenango: Townships of Columbus, Sherburne and New Berlin.

Delaware: Townships of Andes, Bovina, Middletown, Roxbury, Franklin, Hamden, Stamford, Delhi, Kortright, Harpersfield, Merideth and Davenport.

WAGES

Class 1: All support laborers/sandhogs working above the shaft or tunnel.

Class 2: All laborers/sandhogs working in the shaft or tunnel.

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

WAGES: (per hour)

	07/01/2023	06/01/2024	06/01/2025
Class 1	\$ 55.55	\$ 57.05	\$ 58.55
Class 2	57.70	59.20	60.70
Class 4	64.10	65.60	67.10
Class 5	47.65	49.90	51.40

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 3.00 an hour.

SHIFT DIFFERENTIAL...On all Government mandated irregular shift work:

- Employee shall be paid at time and one half the regular rate Monday through Friday.
- Saturday shall be paid at 1.65 times the regular rate.
- Sunday shall be paid at 2.15 times the regular rate.

SUPPLEMENTAL BENEFITS

Per hour:

Benefit 1	\$ 35.73	\$ 36.98	\$ 38.23
Benefit 2	51.01	TBD	TBD
Benefit 3	71.28	TBD	TBD

Benefit 1 applies to straight time hours, paid holidays not worked.

Benefit 2 applies to over 8 hours in a day (M-F), irregular shift work hours worked, and Saturday hours worked.

Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

When a recognized Holidays falls on Saturday or Sunday, holidays falling on Saturday shall be recognized or observed on Friday and holidays falling on Sunday shall be recognized or observed on Monday. Employees ordered to work on the Saturday or Sunday of the holiday or on the recognized or the observed Friday or Monday for those holidays falling on Saturday or Sunday shall receive double time the established rate and benefits for the holiday.

REGISTERED APPRENTICES

FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and location where the work is to be performed.

11-17/60/235/754Tun

Lineman Electrician

02/01/2024

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.

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. (Ref #14.01.01)

Per hour:	07/01/2023	05/06/2024
Lineman, Technician	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	57.40	58.90
Welder, Cable Splicer	57.40	58.90
Digging Mach. Operator	51.66	53.01
Tractor Trailer Driver	48.79	50.07
Groundman, Truck Driver	45.92	47.12
Equipment Mechanic	45.92	47.12
Flagman	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	\$ 57.40	\$ 58.90
Crane, Crawler Backhoe	57.40	58.90

Cable Splicer	63.14	64.79
Certified Welder, Pipe Type Cable	60.27	61.85
Digging Mach. Operator	51.66	53.01
Tractor Trailer Driver	48.79	50.07
Groundman, Truck Driver	45.92	47.12
Equipment Mechanic	45.92	47.12
Flagman	34.44	35.34

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	\$ 58.72	\$ 60.22
Crane, Crawler Backhoe	58.72	60.22
Cable Splicer	64.59	66.24
Certified Welder, Pipe Type Cable	61.66	63.23
Digging Mach. Operator	52.85	54.20
Tractor Trailer Driver	49.91	51.19
Groundman, Truck Driver	46.98	48.18
Equipment Mechanic	46.98	48.18
Flagman	35.23	36.13

Additional \$1.00 per hour for entire crew when a helicopter is used.

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. (Ref #14.03.01)

Lineman, Tech, Welder	\$ 59.91	\$ 61.41
Crane, Crawler Backhoe	59.91	61.41
Cable Splicer	59.91	61.41
Digging Mach. Operator	53.92	55.27
Tractor Trailer Driver	50.92	52.20
Groundman, Truck Driver	47.93	49.13
Equipment Mechanic	47.93	49.13
Flagman	35.95	36.85

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: 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 %

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2023	05/06/2024
Lineman, Technician, or Equipment Operators with Crane License	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid
All other Journeyman	\$ 26.40 *plus 7% of the hourly	\$ 26.90 *plus 7% of the hourly

wage paid wage paid

*The 7% is based on the hourly wage paid, 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.

NOTE: 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, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

Overtime See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

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 Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2023	05/06/2024
\$ 26.40	\$ 26.90
*plus 7% of the hourly wage paid	*plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249a

Lineman Electrician - Teledata

02/01/2024

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

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2023	01/01/2024	01/01/2025
Cable Splicer	\$ 37.73	\$ 39.24	\$ 40.81
Installer, Repairman	\$ 35.81	\$ 37.24	\$ 38.73
Teledata Lineman	\$ 35.81	\$ 37.24	\$ 38.73
Tech., Equip. Operator	\$ 35.81	\$ 37.24	\$ 38.73
Groundman	\$ 18.98	\$ 19.74	\$ 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.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2023	01/01/2024	01/01/2025
Journeyman	\$ 5.70	\$ 5.70	\$ 5.70
	*plus 3% of the hourly	*plus 3% of the hourly	*plus 3% of the hourly

wage paid wage paid 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

NOTE: 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

02/01/2024

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting

DISTRICT 6

ENTIRE COUNTIES

Columbia, Dutchess, Orange, Putnam, Rockland, Ulster

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.

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.
(Ref #14.01.02)

Per hour:	07/01/2023	05/06/2024
Lineman, Technician	\$ 50.60	\$ 51.82
Crane, Crawler Backhoe	50.60	51.82
Certified Welder	53.13	54.41
Digging Machine	45.54	46.64
Tractor Trailer Driver	43.01	44.05
Groundman, Truck Driver	40.48	41.46
Equipment Mechanic	40.48	41.46
Flagman	30.36	31.09

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.

NOTE: 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%

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2023	05/06/2024
Lineman, Technician, or Equipment Operators with Crane License	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid
All other Journeyman	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.

NOTE: 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, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.

Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.

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 Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2023	05/06/2024
\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aReg8LT

Lineman Electrician - Tree Trimmer

02/01/2024

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 would include stump removal near underground energized electrical lines, including telephone and CATV lines.

Per hour:	07/01/2023	12/31/2023
Tree Trimmer	\$ 29.80	\$ 31.44
Equipment Operator	26.35	27.80
Equipment Mechanic	26.35	27.80
Truck Driver	21.95	23.15
Groundman	18.07	19.07
Flag person	14.20	14.20*

*NOTE- Rate effective on 01/01/2024 - \$15.00 due to minimum wage increase

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2023	12/31/2023
Journeyman	\$ 10.48 *plus 4.5% of the hourly wage paid	\$ 10.48 *plus 4.5% of the hourly wage paid

* The 4.5% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

NOTE: 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) 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	02/01/2024
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JOB DESCRIPTION Mason - Building **DISTRICT 9**

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	12/04/2023	06/03/2024
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Tile Finisher	\$ 48.36	\$ 48.80	Additional \$ 0.59
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SUPPLEMENTAL BENEFITS

Per Hour:	\$ 22.56*	\$ 22.71*
	+ \$9.86	+ \$9.86

*This portion of benefits subject to same premium rate as shown for overtime wages

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

*Work beyond 10 hours on a Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88A-tf

Mason - Building	02/01/2024
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JOB DESCRIPTION Mason - Building **DISTRICT 9**

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	12/04/2023	06/05/2024
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Tile Setters	\$ 62.98	\$ 63.50	Additional \$ 0.72
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SUPPLEMENTAL BENEFITS

Per Hour:	\$ 25.61*	\$25.81*
	+ \$10.04	+ \$10.04

* This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

(750 hour) term at the following wage rate:

Term:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6501-7000
07/01/2023									
\$21.70	\$26.66	\$33.75	\$38.69	\$42.25	\$45.70	\$49.29	\$54.23	\$57.09	\$61.25
12/04/2023									
\$21.96	\$26.95	\$34.10	\$39.08	\$42.68	\$46.16	\$49.79	\$54.77	57.66	\$61.90

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
07/01/2023									
\$12.55*	\$12.55*	\$15.36*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.88	+\$0.88	+\$1.37	+\$1.42	+\$1.83	+\$1.88	+\$6.03	+\$6.61
12/04/2023									
\$12.55*	\$12.55*	\$15.63*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.89	+\$0.94	+\$1.38	+\$1.43	+\$1.84	+\$1.89	+\$6.04	+\$6.62

* This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52A

Mason - Building

02/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2023

Bricklayer	\$ 45.89
Cement Mason	45.89
Plasterer/Stone Mason	45.89
Pointer/Caulker	45.89

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular workday is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:

Irregular workday requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 37.95
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OVERTIME PAY

OVERTIME:

Cement Mason See (B, E, Q, W) on OVERTIME PAGE.

All Others See (B, E, Q) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5wp-b

Mason - Building

02/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour:

07/01/2023 7/03/2023

Marble Cutters & Setters \$ 62.82 \$ 63.12

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 39.03 \$ 39.34

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage Per Hour:

07/01/2023

750 hour terms at the following wage

1st	2nd	3rd	4th	5th	6th	7th	8th
0-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6751-7500	7500+
\$ 26.42	\$ 39.62	\$ 42.91	\$ 46.22	\$ 49.52	\$ 53.38	\$ 59.67	\$ 62.82

Supplemental Benefits per hour:

07/01/2023

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.38	\$ 28.86	\$ 29.74	\$ 30.60	\$ 31.48	\$ 36.44	\$ 38.17	\$ 39.03

07/03/2023

Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th
0-	3001-	3751-	4501-	5251-	6001-	6751-	7500+

3000	3750	4500	5250	6000	6750	7500	
\$ 26.60	\$ 39.82	\$ 43.13	\$ 46.45	\$ 49.78	\$ 53.64	\$ 59.95	\$ 63.12

Supplemental Benefits Per Hour:

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.54	\$ 29.09	\$ 29.97	\$ 30.84	\$ 31.72	\$ 36.73	\$ 38.48	\$ 39.34

9-7/4

Mason - Heavy&Highway **02/01/2024**

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2023

Bricklayer	\$ 46.39
Cement Mason	46.39
Marble/Stone Mason	46.39
Plasterer	46.39
Pointer/Caulker	46.39

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular workday is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

Irregular workday requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 37.95
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OVERTIME PAY

Cement Mason See (B, E, Q, W)

All Others See (B, E, Q,)

HOLIDAY

Paid: See (5, 6, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

- Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

- Supplemental Benefits are not paid for paid Holiday

- If Holiday is worked, Supplemental Benefits are paid for hours worked.

- Whenever an Employee works within three (3) calendar days before a holiday, the Employee shall be paid for the Holiday.

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5WP-H/H

Operating Engineer - Building / Heavy&Highway

02/01/2024

JOB DESCRIPTION Operating Engineer - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Delaware, Orange, Rockland, Sullivan, Ulster

WAGES

CLASS A5: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with 140ft boom and over.

CLASS A4: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with 100ft to 139ft boom.

CLASS A3: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes with a boom under 100ft.

CLASS A2: Cranes, Derricks and Pile Drivers less than 100 tons with 140ft boom and over.

CLASS A1: Cranes, Derricks and Pile Drivers less than 100 tons with a 100ft to 139ft boom.

CLASS A: Cranes, Derricks and Pile Drivers less than 100 tons with a boom under 100ft.; Autograde Combination Subgrader, Base Material Spreader and Base Trimmer (CMI and Similar Types); Autograde Pavement profiler (CMI and Similar Types); Autograde Pavement Profiler and Recycle type (CMI and Similar Type); Autograde Placer-Trimmer-Spreader Comb. (CMI & Similar types); Autograde Slipform Paver (CMI & Similar Types); Central Power Plants (all types); Chief of Party; Concrete Paving Machines; Drill (Bauer, AMI and Similar Types); Drillmaster, Quarrymaster (Down the Hole Drill), Rotary Drill, Self-Propelled Hydraulic Drill, Self-Powered Drill; Draglines; Elevator Graders; Excavator; Front End Loaders (5 yds. and over); Gradalls; Grader-Rago; Helicopters (Co-Pilot); Helicopters (Communications Engineer);Juntann Pile Driver; Locomotive (Large); Mucking Machines; Pavement & Concrete Breaker, i.e., Superhammer & Hoe Ram; Roadway Surface Grinder; Prentice Truck; Scooper (Loader and Shovel); Shovels; Tree Chopper with Boom; Trench Machines (Cable Plow); Tunnel Boring Machine; Vacuum Truck

CLASS B: "A" Frame; Backhoe (Combination); Boom Attachment on Loaders (Rate based on size of Bucket) not applicable to Pipehook; Boring and Drilling Machines; Brush Chopper, Shredder and Tree Shredder, Tree Shearer; Bulldozer(Fine Grade); Cableways; Carryalls; Concrete Pump; Concrete Pumping System, Pump Concrete and Similar Types; Conveyors (125 ft. and over); Drill Doctor (duties incl. Dust Collector Maintenance); Front End Loaders (2 yds. but less than 5 yds.); Graders (Finish); Groove Cutting Machine (Ride on Type); Heater Planer; Hoists (all type Hoists, shall also include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft Caisson, Snorkel Roof, and/or any other Similar Type Hoisting Machines, portable or stationary, except Chicago Boom Type); Long Boom Rate to be applied if Hoist is "Outside Material Tower Hoist***; Hydraulic Cranes-10 tons and under; Hydraulic Dredge; Hydro-Axe; Hydro Blaster; Jacks-Screw Air Hydraulic Power Operated Unit or Console Type (not hand Jack or Pile Load Test Type); Log Skidder; Pans; Pavers (all) concrete; Plate and Frame Filter Press; Pumpcrete Machines, Squeezecrete & Concrete Pumping (regardless of size); Scrapers; Side Booms; "Straddle"Carrier-Ross and similar types; Winch Trucks (Hoisting); Whip Hammer

CLASS C: Asphalt Curbing Machine; Asphalt Plant Engineer; Asphalt Spreader; Autograde Tube Finisher and Texturing Machine (CMI & Similar types); Autograde Curecrete Machine (CMI & Similar Types); Autograde Curb Trimmer & Sidewalk, Shoulder, Slipform (CMI & Similar Types); Bar Bending Machines (Power); Barrier Moving Machine-Zipper; Batchers, Batching Plant and Crusher on Site; Belt Conveyor Systems; Boom Type Skimmer Machines; Bridge Deck Finisher; Bulldozer(except fine grade); Car Dumpers (Railroad); Compressor and Blower Type Units (used independently or mounted on dual purpose Trucks, on Job Site or in conjunction with jobsite, in Loading and Unloading of Concrete, Cement, Fly Ash, Instantcrete, or Similar Type Materials); Compressors (2 or 3 in Battery); Concrete Finishing Machines; Concrete cleaning decontamination machine operator; Concrete Saws and Cutters (Ride-on type); Concrete Spreaders (Hetzel, Rexomatic and Similar Types); Concrete Vibrators; Conveyors (under 125 feet); Crushing Machines; Directional Boring Machines; Ditching Machine-small (Ditch-witch, Vermeer, or Similar type); Dope Pots (Mechanical with or without pump); Dumpsters; Elevator; Fireman; Fork Lifts (Economobile, Lull and Similar Types of Equipment); Front End Loaders (1 yd. and over but under 2 yds.); Generators (2 or 3 in Battery); Giraffe Grinders; Grout Pump; Gunnite Machines (excluding nozzle); Hammer Vibrator (in conjunction with Generator); Heavy Equipment Robotics Operator Technician; Hoists-Roof, Tugger, Aerial Platform Hoist & House Cars; Hoppers; Hopper Doors (power operated); Hydro Blaster; Hydraulic Jacking Trailer; Ladders (motorized); Laddervator; Locomotive-dinky type; Maintenance -Utility Man; Master Environmental Maintenance Technician; Mechanics; Mixers (Excepting Paving Mixers); Motor Patrols; Pavement Breakers (small self - propelled ride on type-also maintains compressor hydraulic unit); Pavement Breaker-truck mounted; Pipe Bending Machine (Power); Pitch Pump; Plaster Pump (regardless of size); Post Hole Digger (Post Pounder & Auger); Pot Hole Killer Trucks or equivalent; Rod Bending Machines (Power); Roller-Black Top; Scales (Power); Seaman pulverizing mixer; Shoulder widener; Silos; Skidsteer (all attachments); Skimmer Machines (boom-type); Steel Cutting Machine (service & maintain); Tam Rock Drill; Tractors; Transfer Machine; Captain (Power Boats); Tug Master (powerboats); Ultra High Pressure Waterjet Cutting Tool System operator/maintenance technician; Vacuum Blasting Machine; Vibrating Plants (used in conjunction with unloading); Welder and Repair Mechanics

CLASS D: Brooms and Sweepers; Chippers; Compressor (single); Concrete Spreaders (small type); Conveyor Loaders (not including Elevator Graders); Engines-large diesel (1620 HP) and Staging Pump; Farm Tractors; Fertilizing Equipment (Operation & Maintenance of); Fine Grade Machine (small type); Form Line Graders (small type); Front End Loader (under 1 yard); Generator (single); Grease, Gas, Fuel and Oil supply trucks; Heaters (Nelson or other type incl. Propane, Natural Gas or Flowtype Units); Lights, Portable Generating Light Plants; Mixers (Concrete, small); Mulching Equipment (Operation and Maintenance of); Pumps (2 or less than 4 inch suction); Pumps (4 inch suction and over incl. submersible pumps); Pumps (Diesel Engine and Hydraulic-immaterial of power); Road Finishing Machines (small type); Rollers-grade, fill or stone base; Seeding Equip. (Operation and Maintenance of); Sprinkler & Water Pump Trucks (used on jobsite or in conjunction with jobsite); Steam Jennies and Boilers-irrespective of use; Stone Spreader; Tamping Machines, Vibrating Ride-on; Temporary Heating Plant (Nelson or other type, incl. Propane, Natural Gas or Flow Type Units); Water & Sprinkler Trucks (used on or in conjunction with jobsite); Welding Machines (Gas, Diesel, and/or Electric Converters of any type, single, two, or three in a battery); Wellpoint Systems (including installation by Bull Gang and Maintenance of)

CLASS E: Assistant Engineer/Oiler; Drillers Helper; Maintenance Apprentice (Deck Hand); Maintenance Apprentice (Oiler); Mechanics' Helper; Tire Repair and Maintenance; Transit/Instrument Man

WAGES:(per hour)

	07/01/2023	07/01/2024 Additional	07/01/2025 Additional
Class A5	\$ 65.72 plus 4.00*	\$ 2.75***	\$ 2.50***
Class A4	64.72 plus 4.00*	2.75***	2.50***
Class A3	63.72 plus 4.00*	2.75***	2.50***
Class A2	61.22 plus 4.00*	2.75***	2.50***
Class A1	60.22 plus 4.00*	2.75***	2.50***
Class A	59.22 plus 4.00*	2.75***	2.50***
Class B	57.63 plus 4.00*	2.75***	2.50***
Class C	55.72 plus 4.00*	2.75***	2.50***
Class D	54.09 plus 4.00*	2.75***	2.50***
Class E	50.38 plus 4.00*	2.75***	2.50***
Safety Engineer	59.96 plus 4.00*	2.75***	2.50***
Helicopter:			
Pilot/Engineer	61.04 plus 4.00*	2.75***	2.50***
Co Pilot	59.22 plus 4.00*	2.75***	2.50***
Communications Engineer	59.22 plus 4.00*	2.75***	2.50***
Surveying:			
Chief of Party	59.22 plus 4.00*	2.75***	2.50***
Transit/Instrument Man	50.38 plus 4.00*	2.75***	2.50***
Rod/Chainman	49.80 plus 4.00*	2.75***	2.50***
Additional \$0.75 for Survey work Tunnel under compressed air.			
Additional \$0.50 for Hydrographic work.			

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

**Outside Material Hoist (Class B) receives additional \$ 1.00 per hour on 110 feet up to 199 feet total height, \$ 2.00 per hour on 200 feet and over total height.

***To be allocated at a later date

- SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.

- On HAZARDOUS WASTE REMOVAL or ASBESTOS REMOVAL work, or any state or federally DESIGNATED HAZARDOUS WASTE SITE:

For projects bid on or before April 1, 2020...Where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection, the Operating Engineer shall receive the hourly wage plus an additional twenty percent (20%) of that wage for the entire shift.

For projects bid after April 1, 2020...On hazardous waste removal work of any kind, including state or federally designated site where the operating engineer is required to wear level A, B, or C personal protection the operating engineer shall receive an hourly wage rate of his regular hourly wage plus \$5.00 per hour. An operating engineer working at a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A, B, or C personal protection, shall receive an hourly wage rate of his regular rate plus \$ 1.00 per hour. This shall also apply to sites where the level D personal protection is required.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 33.50

SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.

OVERTIME PAY

See (B, E, Q, *V, X) on OVERTIME PAGE

*15% premium is also required on shift work benefits

HOLIDAY

Paid: See (5, 6, 10, 13, 15) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 13, 15) on HOLIDAY PAGE

Holidays falling on Sunday will be celebrated on Monday.

REGISTERED APPRENTICES

(1) year terms at the following percentage of journeyman's wage:

1st year	60% of Class base wage plus \$4.00*
2nd year	70% of Class base wage plus \$4.00*
3rd year	80% of Class base wage plus \$4.00*
4th year	90% of Class base wage plus \$4.00*

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

Supplemental Benefits per hour:

Apprentices \$ 33.50

11-825

Operating Engineer - Marine Dredging

02/01/2024

JOB DESCRIPTION Operating Engineer - Marine Dredging

DISTRICT 4

ENTIRE COUNTIES

Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2023	10/01/2023
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 43.94	\$ 45.26
CLASS A2 Crane Operator (360 swing)	39.16	40.33
CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	38.00	39.14
CLASS B2 Certified Welder	35.77	36.84
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	34.79	35.83

CLASS C2 Boat Operator	33.67	34.68
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	27.97	28.81

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	\$ 11.85 plus 6% of straight time wage, Overtime hours add \$ 0.63	\$ 12.00 plus 6% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50	\$ 11.75 plus 6% of straight time wage, Overtime hours add \$ 0.50
All Class D	\$ 11.35 plus 6% of straight time wage, Overtime hours add \$ 0.38	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50

OVERTIME PAY

See (B2, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Steel Erectors

02/01/2024

JOB DESCRIPTION Operating Engineer - Steel Erectors

DISTRICT 11

ENTIRE COUNTIES

Delaware, Orange, Rockland, Sullivan, Ulster

WAGES

CLASS A3: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with a 140 ft. boom and over.

CLASS A2: Cranes, Derricks and Pile Drivers 100 tons or more and Tower Cranes, with up to a 139 ft. boom and under.

CLASS A1: Cranes, Derricks and Pile Drivers less than 100 tons with a 140 ft. boom and over.

CLASS A: Cranes, Derricks and Pile Drivers less than 100 tons with up to a 139 ft. boom and under.

CLASS B: "A" Frame; Cherry Pickers(10 tons and under); Hoists (all type Hoists, shall also include Steam, Gas, Diesel, Electric, Air Hydraulic, Single and Double Drum, Concrete, Brick Shaft Caisson, Snorkel Roof, and/or any other Similar Type Hoisting Machines, portable or stationary, except Chicago Boom Type); Jacks-Screw Air Hydraulic Power Operated Unit or Console Type (not hand Jack or Pile Load Test Type); Side Booms; Straddle Carrier

CLASS C: Aerial Platform used as Hoist; Compressors (2 or 3 in Battery); Concrete cleaning/ decontamination machine operator; Directional Boring Machines; Elevator or House Cars; Conveyers and Tugger Hoists; Fireman; Fork Lifts; Generators (2 or 3 in Battery); Heavy Equipment Robotics Operator/Technician; Master Environmental Maintenance Technician; Maintenance -Utility Man; Rod Bending Machines (Power); Captain(powerboat); Tug Master; Ultra High Pressure Waterjet Cutting Tool System; Vacuum Blasting Machine; Welding Machines(gas or electric,2 or 3 in battery, including diesels); Transfer Machine; Apprentice Engineer/Oiler with either one compressor or one welding machine when used for decontamination and remediation

CLASS D: Compressor (single); Welding Machines (Gas, Diesel, and/or Electric Converters of any type); Welding System Multiple (Rectifier Transformer type)

CLASS E: Assistant Engineer/Oiler; Maintenance Apprentice (Deck Hand); Drillers Helper; Maintenance Apprentice (Oiler); Mechanics' Helper; Transit/Instrument Man

WAGES:(per hour)

	07/01/2023	07/01/2024	07/01/2025
		Additional	Additional
Class A3	\$ 67.74 plus 4.00*	\$ 2.75**	\$ 2.50**
Class A2	66.08 plus 4.00*	2.75**	2.50**
Class A1	63.24 plus 4.00*	2.75**	2.50**
Class A	61.58 plus 4.00*	2.75**	2.50**
Class B	58.79 plus 4.00*	2.75**	2.50**
Class C	56.13 plus 4.00*	2.75**	2.50**
Class D	54.60 plus 4.00*	2.75**	2.50**
Class E	50.84 plus 4.00*	2.75**	2.50**
Vacuum Truck	59.55 plus 4.00*	2.75**	2.50**
Safety Engineer	60.41 plus 4.00*	2.75**	2.50**

Helicopter:			
Pilot/Engineer	63.24 plus 4.00*	2.75**	2.50**
Co Pilot	54.60 plus 4.00*	2.75**	2.50**
Communications Engineer	62.85 plus 4.00*	2.75**	2.50**

Surveying:			
Chief of Party	59.55 plus 4.00*	2.75**	2.50**
Transit/Instrument man	50.84 plus 4.00*	2.75**	2.50**
Rod/Chainman	49.80 plus 4.00*	2.75**	2.50**
Additional \$0.75 for Survey work Tunnels under compressed air.			
Additional \$0.50 for Hydrographic work.			

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

**To be allocated at a later date

- SHIFT WORK: On all Government mandated irregular or off shift work, an additional 15% on straight time hours.
- On HAZARDOUS WASTE REMOVAL or ASBESTOS REMOVAL work, or any state or federally DESIGNATED HAZARDOUS WASTE SITE:

For projects bid on or before April 1, 2020...Where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection, the Operating Engineer shall receive the hourly wage plus an additional twenty percent (20%) of that wage for the entire shift.

For projects bid after April 1, 2020...On hazardous waste removal work of any kind, including state or federally designated site where the operating engineer is required to wear level A, B, or C personal protection the operating engineer shall receive an hourly wage rate of his regular hourly wage plus \$5.00 per hour. An operating engineer working at a hazardous waste removal project or site at a task requiring hazardous waste related certification, but who is not working in a zone requiring level A, B, or C personal protection, shall receive an hourly wage rate of his regular rate plus \$ 1.00 per hour. This shall also apply to sites where the level D personal protection is required.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 33.50

OVERTIME PAY

See (B, E, Q, *V, X) on OVERTIME PAGE

*15% premium is also required on shift work benefits

HOLIDAY

Paid: See (5, 6, 10, 13, 15) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 13, 15) on HOLIDAY PAGE

Holidays falling on Sunday will be celebrated on Monday.

REGISTERED APPRENTICES

(1) year terms at the following percentage of journeyman's wage.

1st year	60% of Class base wage plus \$4.00*
2nd year	70% of Class base wage plus \$4.00*
3rd year	80% of Class base wage plus \$4.00*

4th year 90% of Class base wage plus \$4.00*

*The \$4.00 is added to the Class Base Wage for all hours worked. Additionally, the \$4.00 is subject to the V-Code listed on the OVERTIME CODE Sheet.

Supplemental Benefits per hour:

Apprentices \$ 33.50

11-825SE

Painter

02/01/2024

JOB DESCRIPTION Painter

DISTRICT 1

ENTIRE COUNTIES

Rockland

WAGES

Wages per hour

07/01/2023 07/01/2024
Additional

Brush/Paper Hanger	\$ 41.17	+ \$1.93*
Dry Wall finisher	41.17	+ \$1.93*
Sandblaster-Painter	41.17	+ \$1.93*
Lead Abatement	41.17	+ \$1.93*
Spray Rate	42.17	+ \$1.93*

(*) To be allocated at later date.

See Bridge Painters rates for the following work:

Structural Steel, all work performed on tanks, ALL BRIDGES, towers, smoke stacks, flag poles. Rate shall apply to all of said areas from the ground up.

SUPPLEMENTAL BENEFITS

Per hour

Journey person \$ 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

Six (6) month terms at the following percentage of Journey person's wage

1st	2nd	3rd	4th	5th	6th
50%	55%	65%	75%	85%	95%

Supplemental Benefits per hour worked

1st term	\$ 11.14
All others	26.28

1-155ROC

Painter - Bridge & Structural Steel

02/01/2024

JOB DESCRIPTION Painter - Bridge & Structural Steel

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per Hour:

STEEL:

Bridge Painting:	07/01/2023 10/01/2023
	\$ 54.50 \$ 56.00

+ 10.10* + 10.35*

ADDITIONAL \$6.50 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, 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.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:

\$ 11.78	\$ 12.43
+ 30.85*	+ 31.55*

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage - Per hour:

Apprentices: (1) year terms.

1st year	\$ 21.80 + 4.04	\$ 22.40 + 4.14
2nd year	\$ 32.70 + 6.06	\$ 33.60 + 6.21
3rd year	\$ 43.60 + 8.08	\$ 44.80 + 8.28
Supplemental Benefits - Per hour:		
1st year	\$.90 + 12.34	\$ 1.16 + 12.62
2nd year	\$ 7.07 + 18.51	\$ 7.46 + 18.93
3rd year	\$ 9.42 + 24.68	\$ 9.94 + 25.24

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping

02/01/2024

JOB DESCRIPTION Painter - Line Striping

DISTRICT 8

ENTIRE COUNTIES

Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per hour:

Painter (Striping-Highway):	07/01/2023	01/01/2024	07/01/2024
Striping-Machine Operator*	\$ 31.53	\$ 31.53	\$ 34.12
Linerman Thermoplastic	38.34	38.34	41.12

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker:

Striping Machine Operator:	\$ 10.03	\$ 22.24	\$ 23.65
Linerman Thermoplastic:	10.03	22.24	23.65

OVERTIME PAY

See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE

Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rates:

1st Term:	\$ 15.00	\$ 15.00	\$ 15.00
2nd Term:	18.92	18.92	20.47
3rd Term:	25.22	25.22	27.30

Supplemental Benefits per hour:

1st term:	\$ 9.16	\$ 22.24	\$ 23.65
2nd Term:	10.03	22.24	23.65
3rd Term:	10.03	22.24	23.65

8-1456-LS

Painter - Metal Polisher

02/01/2024

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

	07/01/2023
Metal Polisher	\$ 38.18
Metal Polisher*	39.28
Metal Polisher**	42.18

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Journeyworker:

All classification \$ 12.34

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:

07/01/2023

1st year	\$ 16.00
2nd year	17.00
3rd year	18.00
1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:

Per hour:

1st year	\$ 8.69
2nd year	8.69
3rd year	8.69

8-8A/28A-MP

Plumber

02/01/2024

JOB DESCRIPTION Plumber

DISTRICT 11

ENTIRE COUNTIES

Orange, Rockland, Sullivan

PARTIAL COUNTIES

Ulster: Only the Townships of Plattekill, Marlboro, Wawarsing, and Shawangunk (except for Wallkill and Shawangunk Prisons).

WAGES

REFRIGERATION: For commercial and industrial refrigeration which means service, maintenance, and installation work where the combined compressor tonnage does not exceed 40 tons.

AIR CONDITIONING: Air conditioning to be installed that is water cooled shall not exceed 25 tons. This will include the piping of the component system and erection of water tower. Air conditioning that is air cooled shall not exceed 50 tons.

WAGES: (per hour)

	07/01/2023	05/01/2024	05/01/2025
		Additional	Additional
Plumber	\$ 38.59	\$ 2.25*	\$ 2.50*

*To be allocated at a later date

Star Certification: an additional \$ 1.00 per hour over scale will be paid to all those who have Star Certification.

Shift Differential: When mandated by the governmental agency, an additional 15% premium will be paid for irregular work day or for 2nd and 3rd shift.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman

\$ 36.07*

*For overtime or shift differential work, \$0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

OVERTIME PAY

See (B, G, P, *V) on OVERTIME PAGE

* A portion of the benefit amount is subject to the V code for overtime and shift differential work.

HOLIDAY

Paid: See (5, 6, 13, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 13, 15, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1)year terms at the following wage.

07/01/2023

1st term	\$ 17.37
2nd term	21.23
3rd term	25.09
4th term	28.95
5th term	32.81

Supplemental Benefits per hour:
Apprentices

1st term	\$ 16.31*
2nd term	19.90*
3rd term	23.50*
4th term	27.10*
5th term	30.69*

*For overtime or shift differential work, \$0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.
11-373 Refrig

Plumber

02/01/2024

JOB DESCRIPTION Plumber

DISTRICT 11

ENTIRE COUNTIES

Orange, Rockland, Sullivan

PARTIAL COUNTIES

Ulster: Only the Townships of Plattekill, Marlboro, Wawarsing, and Shawangunk (except for Wallkill and Shawangunk Prisons).

WAGES

WAGES:(per hour)	07/01/2023	05/01/2024
		Additional
Plumber/Steamfitter	\$ 49.95	\$ 2.25*

*to be allocated at a later date

Note: For all work 40-60 feet above ground add \$ 0.25 per hour, over 60 feet add \$ 0.50 per hour.

Shift Differential: When mandated by the governmental agency, an additional 15% premium will be paid for irregular work day or for 2nd and 3rd shift.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 44.57

*For overtime or shift differential work, \$0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

* A portion of the benefit amount is subject to the V code for overtime and shift differential work.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

When a holiday falls on a Saturday, the day prior shall be considered and recognized as the holiday. When a holiday falls on a Sunday, the day proceeding shall be considered and recognized as the holiday to be observed.

REGISTERED APPRENTICES

(1) year terms at the following wages.

07/01/2023

1st term	\$ 17.49
2nd term	22.48
3rd term	27.48
4th term	32.47

5th term 39.96

Supplemental Benefits per hour:

1st term	\$ 15.69*
2nd term	20.14*
3rd term	24.57*
4th term	29.03*
5th term	35.67*

*For overtime or shift differential work, \$0.10 is paid at straight time, the remaining balance is paid at the same premium as the wages.
11-373 SF

Roofer

02/01/2024

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2023	05/01/2024
		Additional
Roofer/Waterproofer	\$ 46.50	\$2.50
	+ \$7.00*	

* This portion is not subjected to overtime premiums.

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS

Per Hour: \$ 31.37

OVERTIME PAY

See (B, H) on OVERTIME PAGE

Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year term apprentices indentured prior to 01/01/2023

1st	2nd	3rd	4th
\$ 16.28	\$ 23.25	\$ 27.90	\$ 34.88
	+ 3.50*	+ 4.20*	+ 5.26*

Supplements:

1st	2nd	3rd	4th
\$ 4.03	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

(1) year term apprentices indentured after 01/01/2023

1st	2nd	3rd	4th	5th
\$ 17.67	\$ 20.93	\$ 23.25	\$ 27.90	\$ 34.88
	+ 3.16*	+ 3.50*	+ 4.20*	+ 5.26

Supplements:

1st	2nd	3rd	4th	5th
\$ 7.61	\$ 14.29	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker

02/01/2024

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

	07/01/2023
SheetMetal Worker	\$ 47.00
	+ 3.60*

*This portion is not subject to overtime premiums.

SHIFT WORK

For all NYS D.O.T. and other Governmental mandated off-shift work:
10% increase for additional shifts for a minimum of five (5) days

SUPPLEMENTAL BENEFITS

Journeyworker \$ 45.62

OVERTIME PAY

OVERTIME:.. See (B, E, Q,) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 17.50	\$ 19.67	\$ 21.87	\$ 24.05	\$ 26.24	\$ 28.44	\$ 31.10	\$ 33.75
+ 1.44*	+ 1.62*	+ 1.80*	+ 1.98*	+ 2.16*	+ 2.34*	+ 2.52*	+ 2.70*

*This portion is not subject to overtime premiums.

Supplemental Benefits per hour:

Apprentices

1st term	\$ 19.53
2nd term	21.99
3rd term	24.42
4th term	26.88
5th term	29.32
6th term	31.75
7th term	33.72
8th term	35.71

8-38

Sheetmetal Worker

02/01/2024

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Sign Erector \$ 56.00

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Sign Erector \$ 55.66

OVERTIME PAY

See (A, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:

6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2023

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
-----	-----	-----	-----	-----	-----	-----	-----	-----	------

\$ 14.95	\$ 16.95	\$ 18.93	\$ 20.93	\$ 28.56	\$ 31.05	\$ 33.57	\$ 36.05	\$ 38.56	\$ 41.05
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4-137-SE

Sprinkler Fitter	02/01/2024
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JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

Per hour 07/01/2023

Sprinkler \$ 50.86
Fitter

SUPPLEMENTAL BENEFITS

Per hour

Journey person \$ 30.19

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
\$ 24.77	\$ 27.53	\$ 30.03	\$ 32.78	\$ 35.53	\$ 38.29	\$ 41.04	\$ 43.79	\$ 46.54	\$ 49.30

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.74	\$ 8.74	\$ 20.32	\$ 20.32	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57
									1-669.2

Teamster - Building / Heavy&Highway	02/01/2024
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JOB DESCRIPTION Teamster - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Dutchess, Orange, Rockland, Sullivan, Ulster

WAGES

GROUP 1: LeTourneau Tractors, Double Barrel Euclids, Athney Wagons and similar equipment (except when hooked to scrapers), I-Beam and Pole Trailers, Tire Trucks, Tractor and Trailers with 5 axles and over, Articulated Back Dumps and Road Oil Distributors, Articulated Water Trucks and Fuel Trucks/Trailers, positions requiring a HAZMAT CDL endorsement.

GROUP 1A: Drivers on detachable Gooseneck Low Bed Trailers rated over 35 tons.

GROUP 2: All equipment 25 yards and up to and including 30 yard bodies and cable Dump Trailers and Powder and Dynamite Trucks.

GROUP 3: All Equipment up to and including 24-yard bodies, Mixer Trucks, Dump Crete Trucks and similar types of equipment, Fuel Trucks, Batch Trucks and all other Tractor Trailers, Hi-Rail Truck.

GROUP 4: Tri-Axles, Ten Wheelers, Grease Trucks, Tillerman, Pattern Trucks, Attenuator Trucks, Water Trucks, Bus.

GROUP 5: Straight Trucks.

GROUP 6: Pick-up Trucks for hauling materials and parts, and Escort Man over-the-road.

WAGES: (per hour) 07/01/2023

GROUP 1	\$ 34.58
GROUP 1A	35.72
GROUP 2	34.02
GROUP 3	33.80
GROUP 4	33.69
GROUP 5	33.57
GROUP 6	33.57

NOTE ADDITIONAL PREMIUMS:

- On projects requiring an irregular shift a premium of 10% will be paid on wages. The premium will be paid for off-shift or irregular shift work when mandated by Governmental Agency.
- Employees engaged in hazardous/toxic waste removal, on a State or Federally designated hazardous/toxic waste site, where the employee comes in contact with hazardous/toxic waste material and when personal protective equipment is required for respiratory, skin, or eye protection, the employee shall receive an additional 20% premium above the hourly wage.

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

First 40 hours	\$ 44.59
Over 40 hours	36.99

OVERTIME PAY

See (*B, E, **E2, ***P, X) on OVERTIME PAGE

*Holidays worked Monday through Friday receive Double Time (2x) after 8 hours.

**Makeup day limited to the employees who were working on the site that week.

***Sunday Holidays are paid at a rate of double time and one half (2.5x) for all hours worked.

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (*1) on HOLIDAY PAGE

- Any employee working two (2) days in any calendar week during which a holiday occurs shall receive a days pay for each holiday occurring during said week. This provision shall also apply if a holiday falls on a Saturday or Sunday.

*See OVERTIME PAY section for when additional premium is applicable on Holiday hours worked.

11-445B/HH

Teamster - Delivery - Building / Heavy&Highway

02/01/2024

JOB DESCRIPTION Teamster - Delivery - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Dutchess, Orange, Rockland, Sullivan, Ulster

WAGES

Group 1	Tractor Trailer Drivers
Group 2	Tri- Axle

Wages: 07/01/2023

Group 1	\$ 33.70
Group 2	29.70

Hazardous/Toxic Waste Removal additional 20% when personal protective equipment is required.

SUPPLEMENTAL BENEFITS

Per hour paid:

First 40 hours	\$ 32.30
Over 40 hours	0.00

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 13, 15, 16, 20, 22, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 13, 15, 16, 20, 22, 25, 26) on HOLIDAY PAGE

- Employee must work either the scheduled day of work before or the scheduled day of work after the holiday in the workweek.

- Any employee working one (1) day in the calendar week during which a holiday occurs shall receive a day's pay for each holiday occurring during said week. This provision shall also apply if a holiday falls on a Saturday.

- When any of the recognized holidays occur on Sunday and are celebrated any day before or after the holiday Sunday, such days shall be considered as the holiday and paid for as such.

11-445 B/HH Delivery

Welder**02/01/2024**

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 07/01/2023

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
- (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) Saturday and 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
State Office Building Campus
Building 12 - Room 130
Albany, New York 12226

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One)

☐

Contracting Agency

☐

Architect or Engineering Firm

☐

Public Work District Office

Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone

Fax

E-Mail:

2. NY State Units (see Item 5).

☐ 01 DOT

☐ 02 OGS

☐ 03 Dormitory Authority

☐ 04 State University
Construction Fund

☐ 05 Mental Hygiene
Facilities Corp.

☐ 06 OTHER N.Y. STATE UNIT

☐ 07 City

☐ 08 Local School District

☐ 09 Special Local District, i.e.,
Fire, Sewer, Water District

☐ 10 Village

☐ 11 Town

☐ 12 County

☐ 13 Other Non-N.Y. State
(Describe)

3. SEND REPLY TO ☐ (check if new or change)
Name and complete address:

Telephone

Fax

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

☐ New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR
THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

☐

1. New Building

☐

2. Addition to Existing Structure

☐

3. Heavy and Highway Construction (New and Repair)

☐

4. New Sewer or Waterline

☐

5. Other New Construction (Explain)

☐

6. Other Reconstruction, Maintenance, Repair or Alteration

☐

7. Demolition

☐

8. Building Service Contract

8. OCCUPATION FOR PROJECT :

☐ Construction (Building, Heavy
Highway/Sewer/Water)

☐ Tunnel

☐ Residential

☐ Landscape Maintenance

☐ Elevator maintenance

☐ Exterminators, Fumigators

☐ Fire Safety Director, NYC Only

☐ Fuel Delivery

☐ Guards, Watchmen

☐ Janitors, Porters, Cleaners,
Elevator Operators

☐ Moving furniture and
equipment

☐ Trash and refuse removal

☐ Window cleaners

☐ Other (Describe)

9. Does this project comply with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature



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 where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 02/09/2024

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	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
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 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	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
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	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****5078	BLACK RIVER TREE REMOVAL, LLC		29807 ANDREWS ROAD BLACK RIVER NY 13032	10/17/2023	10/17/2028
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
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	*****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025
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	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****4155	CASA BUILDERS, INC.	FRIEDLANDER CONSTRUCTI ON	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

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DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
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
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
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		DAVID FRIEDLANDER		64 NORTH PUTT CORNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DINA TAYLOR		64 N PUTT CONNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
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	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		EUGENIUSZ "GINO" KUCHAR		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL	*****2998	G.E.M. AMERICAN CONSTRUCTION CORP.		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
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	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DA		GIOVANNA TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA	*****0213	GORILLA CONTRACTING GROUP, LLC		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
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		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
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

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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
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
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	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
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 GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
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		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
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

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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
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
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		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
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	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	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
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	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024

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DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
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	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
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 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
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	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		PETER STEVENS		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
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		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL		ROBBYE BISSEsar		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024

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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	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	DA	*****0476	SAMCO ELECTRIC CORP.		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	NYC	*****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	*****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DA		SILVANO TRAVAJA		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	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
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	*****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****9733	TERSALE CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSALE CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSALE DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATION	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		TIMOTHY PERCY		29807 ANDREWS ROAD BLACK RIVER NY 13612	10/17/2023	10/17/2028

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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		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
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		XENOFON EFTHIMIADIS		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Multiple Work Packages.
4. Work under Owner's separate contracts.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: 43065.

1. Project Location: 106 Hammond Road, Thiells, New York, 10984, United States.

B. Owner: North Rockland School District, 65 Chapel Street, Garnerville, New York, 10923, United States.

1. Owner's Representative: Mike Senno Central Office Administrator.

C. Architect: Michael Shilale Architects, LLP, 140 Park Avenue, New City, New York, 10956.

1. Architect's Representative: Michael Shilale Architects, LLP.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

SUMMARY

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1. MEP & Structural : GPI Engineering .
2. Landscape Architect: The LA Group

E. Contractor: to be selected has been engaged as Contractor for this Project.

F. Construction Manager: Palombo Group .

1. Construction Manager Representative: Lou Rodriguez .
2. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for construction between Owner and each Contractor, according to a separate contract between Owner and Construction Manager.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. NRCSD High School Phase 1 Projects and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under coordinated, concurrent multiple contracts. See Section 011200 "Multiple Contract Summary" for a list of multiple contracts, a description of work included under each of the multiple contracts, and the responsibilities of Project coordinator.

1.6 WORK UNDER OWNER'S SEPARATE CONTRACTS

A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Each Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction operations to work area defined on drawings .
2. Driveways, Walkways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

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1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7 a.m. to 4 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Weekend Hours: with approval by the owner .
 - 2. Early Morning Hours: with approval by the owner .
 - 3. Work in Existing Building: not permitted while school is in session .
 - 4. Hours for Utility Shutdowns: to be coordinated with the owner 48 hours in advance .
 - 5. Hours for Core Drilling or loud activities : to be coordinated with owner 48 hours in advance .
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Construction Manager's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Construction Manager's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Owner's property is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 011200 - MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Requirements:
 - 1. Section 011000 "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site, phased construction, coordination with occupants, and work restrictions.
 - 2. Section 013100 "Project Management and Coordination" for general coordination requirements.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

1.4 PROJECT COORDINATOR

- A. Project coordinator shall be responsible for coordination between the General Construction Contract, HVAC Contract, and Electrical Contract.
 - 1. HVAC Contractor will act as the project Coordinator for the entire HVAC project at the High School Building, and coordination with Electrical and General for tasks which HVAC contractor is coordinator for.
 - 2. Chiller Replacement work has been awarded by the owner and is currently under construction. Any chiller work referenced in the construction documents is Not In Contract for the HVAC contractor.

1.5 COORDINATION ACTIVITIES

- A. Coordination activities of Project coordinator include, but are not limited to, the following:
 - 1. Provide overall coordination of the Work.
 - 2. Coordinate shared access to workspaces.
 - 3. Coordinate product selections for compatibility.
 - 4. Provide overall coordination of temporary facilities and controls.
 - 5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
 - 6. Coordinate construction and operations of the Work with work performed by each Contract and Owner's construction forces and separate contracts.

7. Prepare coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
 8. Coordinate sequencing and scheduling of the Work. Include the following:
 - a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - b. Prepare a combined contractors' construction schedule for entire Project. Base schedule on preliminary construction schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.
 - c. bined construction activities of contracts.
 - 1) Submit schedules for approval.
 - 2) Distribute copies of approved schedules to contractors.
 9. Provide photographic documentation.
 10. Provide quality-assurance and quality-control services specified in Section 014000 "Quality Requirements."
 11. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 12. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
 13. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
 14. Provide field surveys of in-progress construction and site work and final property survey.
 15. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
 16. Coordinate cutting and patching.
 17. Coordinate protection of the Work.
 18. Coordinate firestopping.
 19. Coordinate completion of interrelated punch list items.
 20. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
 21. Print and submit record documents if installations by more than one contractor are indicated on the same contract drawing or shop drawing.
 22. Collect record Specification Sections from contractors, collate Sections into numeric order, and submit complete set.
 23. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
- B. Responsibilities of Project coordinator for temporary facilities and controls include, but are not limited to, the following:
1. HVAC Contract shall provide common-use field office for use by all personnel engaged in General & Electrical construction activities.

1.6 GENERAL REQUIREMENTS OF CONTRACTS

- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work of each Contract, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.
1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
 2. Trenches and all excavation/backfill for the work of each contract shall be by the HVAC contract.
 3. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of each contract for its own work.
 4. Furnishing of access panels for the work of each contract shall be the work of each contract for its own work. Installation of access panels shall be the work of the General Construction Contract.

5. Equipment pads for the work of each contract shall be the work of each contract for its own work.
 6. Roof-mounted equipment curbs for the work of each contract shall be the work of each contract for its own work.
 7. Painting for the work of each contract shall be the work of each contract for its own work.
 8. Cutting and Patching: Each contract shall perform its own cutting; patching shall be under the General Construction Contract.
 9. Through-penetration firestopping for the work of each contract shall be provided by each contract for its own work.
 10. Contractors' Startup Construction Schedule: Within five working days after startup horizontal bar-chart-type construction schedule submittal has been received from Project coordinator, submit a matching startup horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
 11. overall construction.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with the remainder of the work.
1. Project coordinator shall coordinate substitutions.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Section 015000 "Temporary Facilities and Controls," each contractor is responsible for the following:
- D. s," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Its own field office, complete with necessary furniture, utilities, and telephone service.
 4. Its own storage and fabrication sheds.
 5. Temporary enclosures for its own construction activities.
 6. Staging and scaffolding for its own construction activities.
 7. General hoisting facilities for its own construction activities.
 8. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 9. Progress cleaning of work areas affected by its operations on a daily basis.
 10. Secure lockup of its own tools, materials, and equipment.
 11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
- E. Temporary Heating, Cooling, and Ventilation: Project coordinator] is responsible for temporary heating, cooling, and ventilation, including utility-use charges, temporary meters, and temporary connections.
- F. Use Charges: Comply with the following:
1. Water Service: Include the cost for water service, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site in the General Construction Contract.
 2. Electric Power Service: Include the cost for electric power service, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site in the General Construction Contract.
- 1.7 GENERAL CONSTRUCTION CONTRACT
- A. Supply all necessary materials, labor, services, equipment, and tools required to perform the following General Construction, work for the Chiller replacement and HVAC upgrades at NRCS High School. All work to be installed in strict accordance with Specifications and Drawings.

- B. Supply all necessary materials, equipment, devices and labor for implementation and up-keep of site safety as it relates to this scope of work, to meet or exceed OSHA and / or safety agencies having jurisdiction on this project. Any and all costs resulting from OSHA sited violations will be the complete responsibility of this subcontractor.
- C. This project is a prevailing wage project, and it is the responsibility of this sub-contractor to ensure that all of the latest rules and regulations published by the NYS Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit are strictly followed and adhered to. In the events of an audit conduct by the NYS Department of Labor, this sub-contractor will be responsible for any and all costs associated with the audit and the Departments' final decision.
- D. Work in the General Construction Contract includes, but is not limited to, the following:
 - 1. Supply all materials, labor, equipment, and tools to install and finish gypsum soffits/ACT tile at renovated locations. Finish and paint all new surfaces, and any damaged existing surfaces. Repair gypsum ceiling if damaged during removal.
 - 2. Demolition of existing ceilings as noted on the plans
 - 3. Supply all materials, labor, equipment, and tools for modifications to all ACT & gypsum ceiling. Base bid and alternates.
 - 4. Supply all materials, labor, equipment, and tools to Finish and paint all new surfaces, and any damaged existing surfaces.
Supply and install structural steel modifications required for RTU's. Make structural modifications to the building's steel frame to support the new RTU's.
 - 5. Structural steel for Chiller dunnage will be by Chiller contract. (not in General Scope)
 - 6. Supply all materials, labor, equipment, and tools to modify/construct all interior walls, gypsum and masonry patching and paint as required.
 - 7. Remove and reinstall existing ceiling tile for necessary mechanical, electrical, structural work.
 - 8. Schedule and perform all inspections required by this scope of work.
 - 9. Demolition of all systems covered under the General Contract shall be by the General Contract.
 - 10. Removal and disposal of daily generated debris. Upon completion of this contractor's work, all excess materials and debris in the building and site are to be removed and disposed of promptly.
 - 11. This is a prevailing wage project.
- E. Temporary facilities and controls in the General Contract include, but are not limited to, the following:
 - 1. Temporary enclosure.
 - 2. Temporary weather protection of finished spaces.

1.8 HVAC CONTRACT

- A. Supply all necessary materials, labor, services, equipment and tools required to perform the following site HVAC work for the project. All work to be installed in strict accordance with Specifications and Drawings. All installations shall conform to the NYS Building Code, and requirements of appropriate regulatory agencies.
- B. Supply all necessary materials, equipment, devices and labor for implementation and up-keep of site safety as it relates to this scope of work, to meet or exceed OSHA and / or safety agencies having jurisdiction on this project. Any and all costs resulting from OSHA sited violations will be the complete responsibility of this subcontractor.
- C. This project is a prevailing wage project, and it is the responsibility of this sub-contractor to ensure that all of the latest rules and regulations published by the NYS Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit are strictly followed and adhered to. In the events of an audit conduct by the NYS Department of Labor, this sub-contractor will be responsible for any and all costs associated with the audit and the Departments' final decision.
- D. Work in the HVAC Contract includes, but is not limited to, the following:
- E. following:

1. Curbs, RTUs, Boilers, Domestic Hot Water and accessories, on High School RTU's
2. All equipment demolition and removal will be by HVAC Contractor.
3. All Hazardous materials removal will be a subcontractor of the HVAC Contractor.
4. Equipment will be hoisted into place by HVAC contract.
5. Assemble roof curbs, set in place, anchor and flash to roof structure.
6. Roof flashing for HS RTU's and Boilers will be by HVAC Contract.
7. Supply and install galvanized supply and return curb transitions.
8. Supply and install all interior and exterior ductwork, registers and diffusers and modifications.
9. Install RTUs onto curbs and weather tight.
10. Install all RTU accessories, including filters.
11. Supply and install all Boiler and domestic hot water piping, pumps, devices.
12. Install thermostats and make connections at RTUs and thermostats.
13. Structural steel for Chiller dunnage will be by Chiller contract. (not in HVAC Scope)
14. Program thermostats for heat, cooling and occupied & unoccupied times.
15. Start up and test RTUs, Split system for heat, cooling and fresh air.
16. Adjust all volume dampers and diffusers to provide proper air flow.
17. Make all ductwork connections for fans.
18. Integration of all new RTU's/Boilers and motors with the districts existing BMS will be by the districts controls vendor. See section "016400 Owner Furnished Products"
19. The remaining work not identified as work under other contracts.
20. Test all fans.
21. Balance system as per specifications.
22. Schedule and perform all inspections required by this scope of work.
23. Removal and disposal of daily generated debris.
24. Supply and install all VFD's.
25. Site Restoration of damaged areas
26. All equipment not stated as supplied by owner in section "016400 Owner Furnished Products" will be provided and installed by the HVAC Contract.
27. Upon completion of this contractor's work, all excess materials and debris in the building and site are to be removed and disposed of promptly.
28. File, pay for, and obtain all required permits, inspections and approvals.
29. This is a prevailing wage project.

F. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:

1. Temporary facilities and controls that are not otherwise specifically assigned to the Electrical Contract or General Contract.
2. Temporary enclosure for building exterior, except as indicated.
3. General waste disposal facilities.
4. Temporary fire-protection facilities.
5. Environmental protection.
6. Restoration of Owner's existing facilities used as temporary facilities.

1.9 ELECTRICAL CONTRACT

- A. Supply all necessary materials, labor, services, equipment and tools required to perform the following site electrical work for the project. All work to be installed in strict accordance with Specifications and Drawings. All installations shall conform to the NYS Building Code, and requirements of appropriate regulatory agencies.
- B. Supply all necessary materials, equipment, devices and labor for implementation and up-keep of site safety as it relates to this scope of work, to meet or exceed OSHA and / or safety agencies having jurisdiction on this project. Any and all costs resulting from OSHA sited violations will be the complete responsibility of this subcontractor.
- C. This project is a prevailing wage project and it is the responsibility of this sub-contractor to ensure that all of the latest rules and regulations published by the NYS Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit are strictly followed and adhered to. In the events of an audit conduct by the NYS Department of Labor, this sub-contractor will be responsible for any and all costs associated with the audit and the Departments' final decision.
- D. Work in the Electrical Contract includes, but is not limited to, the following:

- E. I Contract includes, but is not limited to, the following:
1. Supply and install all electrical materials, devices and equipment for the project.
 2. Supply and install complete electrical service from source to factory installed transformers, MDP, electrical panels, wiring, and devices.
 3. Disconnect and reconnection to all RTU's, Boilers, pumps and equipment.
 4. Supply and install all conduits, wiring from existing High School panels to new equipment.
 5. Disconnect and reconnect all electrical equipment for other trades.
 6. Supply and install Boiler's/RTU disconnects and make electrical connections.
 7. Supply and install Boiler's/RTU maintenance receptacles and make electrical connections.
 8. Supply and install all interior light fixtures.
 9. Supply and install all exit lights and emergency lights.
 10. Wire all VFD's.
 11. Disconnection and reconnection of all Fire alarm devices
 12. Disconnect and re-connection of all audio systems.
 13. Provide and install new Lighting and cable support and support trays.
 14. Test all site installed systems.
 15. Test all factory installed systems.
 16. Supply and install fire alarm modifications and new systems. Coordinate with owners monitoring service.
 17. File and obtain and pay for all required permits, inspections and approval.
 18. Schedule and perform all inspections required by this scope of work.
 19. Removal and disposal of daily generated debris.
 20. Upon completion of this contractor's work, all excess materials and debris in the building, connecting link and site are to be removed and disposed of promptly, and site restored to original condition.
 21. This is a prevailing wage project.
- F. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:
1. Electric power service and distribution.
 2. Lighting, including site lighting.
 3. Electrical connections to existing systems and temporary facilities and controls furnished by the, HVAC Contract, Electrical Contract, General Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011200

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
 - 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

ALLOWANCES

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1.6 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 UNIT-COST ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.9 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight [,] and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

ALLOWANCES

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1.10 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of testing and inspection services not specifically required by the Contract Documents are Contractor responsibilities and are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.11 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

ALLOWANCES

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3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Clean existing main ductwork for 20 linear feet per unit at RTUS D1 and D2.
- B. Allowance No. 2: Replace existing supply and return piping and insulation for 20 linear feet per unit at RTUS D1 and D2.
- C. Allowances No. 3: Provide proposal from third party HVAC commissioning agent for owner to contract with (deduct allowance).
- D. Allowance No. 4: \$40,000 allowance for cable routing in ceiling as part of alternate No. 2 contractor to provide time & material backup for work performed.
- E. Allowance No. 5: \$40,000 allowance for cable routing in ceiling as part of alternate No. 3. Contractor to provide time & material backup for work performed.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.
 - 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Section 014000 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1: Provide unit price to add or reduce 10 linear feet of existing main ductwork for each unit. Price is per 10 linear feet.

- B. Unit Price No. 2: Provide unit price to add or reduce existing supply and return piping and insulation for 10 linear feet each unit. Price is per 10 linear feet.
- C. Unit Price No. 3: Provide unit price to add or reduce 10 linear feet of cable tray to alternates No.2 and 3

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

- 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Void
- B. Alternate No. 2: Remove existing ceiling in annex gymnasium, prepare and paint existing exposed roof deck/ structural steel/ conduits/ductwork, rehang electrical components + fire alarm audio wire and install new suspended

lighting. Install 800 LF of new cable trays for electrical wires. Install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting will be accepted as part of this alternate.

- C. Alternate No. 3: Remove existing ceiling in main gymnasium, prepare and paint existing exposed roof deck/ structural steel/ conduits/ ductwork, rehang electrical components + fire alarm audio wire and install new suspended lighting. Install 800 LF of new cable trays for electrical wires. Install new gypsum soffit at operable partition track as per plans. Allowance No. 4 for cable rerouting. Allowance No. 5 for cable rerouting will be accepted as part of this alternate.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012300 "Alternates" for products selected under an alternate.
 - 3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided in Project Manual .
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.

- h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES .
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work . Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

Request for Substitution

This form must be completely filled in with all relevant data by the Subcontractor and submitted to the Project Manager for consideration before any request to change the drawing or specification requirements will be considered.

REFERENCE DATA

Project name: _____ Date of Request: _____
Location: _____ Architect's Job No: _____
Request by (firm): _____
Address: _____
Contact person: _____ Phone: _____ FAX: _____
Subcontract works: _____ Package No: _____

SUBSTITUTION REQUEST DATA

SUBSTITUTION REQUESTED IS FOR:

Reason for request: _____

☐

Named product.

☐

Product type, material, finish or formulation.

☐

Fabrication or installation methods.

PRODUCT / MATERIAL / METHOD FOR WHICH SUBSTITUTION IS REQUESTED IS SHOWN ON THE FOLLOWING DOCUMENTS:

Specification: Section No: _____ Page(s): _____ Clause No(s): _____

Drawings: (List No's of all Drawings affected): _____

COST/BENEFIT ANALYSIS

Describe in detail any alteration to any other part of the Works required by use of the requested substitution:

Total nett cost of any such other required alterations, including overhead and profit: \$ _____

Cost of Builder's administration (to be filled in by Builder): \$ _____

Cost of Architect's documentation and administration (to be filled in by Project Manager): \$ _____

Total cost of such other alterations (to be filled in by Project Manager): \$ _____

Total cost savings achieved (from page 2, to be filled in by Project Manager): \$ _____

Total cost/benefit to Proprietor (to be filled in by Project Manager): \$ _____

Benefits to Proprietor other than financial: _____

ADDITIONAL INFORMATION REQUIRED

COMPLETE THE REVERSE SIDE AS APPLICABLE.

ATTACH THE FOLLOWING INFORMATION:

- 1 Manufacturer's technical data sheets on proposed products.
- 2 Manufacturer's standard form of warranty.
- 3 Letter on manufacturer's letterhead stating that manufacturer will warrant products as specified, if specification

COMPARISON OF OPTIONS

Fill in the following blanks as are applicable to the product, material or method type. As a guide, if the item is mentioned in the Specification as a performance or materials requirement, then information about the proposed substitution is required by the Project Manager to evaluate the proposed substitution. Requests lacking relevant information will be returned without action.

SPECIFIED PRODUCT, MATERIAL OR METHOD

Description: _____

Product Name: _____

Type: _____

Model No: _____

Fire rating (hours): _____

Thickness: _____

Composition: _____

Availability (time): _____

Country of manufacture: _____

Substrate preparation required: _____

Length of warranty available (years): _____

Sound transfer coefficient (STC): _____

Exposure class: _____

Resistance to chemicals (list): _____

Other specified performance criteria (list):

UNIT COST OF PRODUCT / MATERIAL (Must be completed):

\$ _____ What _____

Units required: _____ Total value: \$ _____

PROPOSED SUBSTITUTION

Description: _____

Product Name: _____

Type: _____

Model No: _____

Fire rating (hours): _____

Thickness: _____

Composition: _____

Availability (time): _____

Country of manufacture: _____

Substrate preparation required: _____

Length of warranty available (years): _____

Sound transfer coefficient (STC): _____

Exposure class: _____

Resistance to chemicals (list): _____

Other specified performance criteria (list):

UNIT COST OF PRODUCT / MATERIAL (Must be completed):

\$ _____ What _____

Units required: _____ Total value: \$ _____

BUILDER'S REVIEW

I certify that I have checked the above documentation for the proposed Request for Substitution and warrant it to be substantially complete and accurate:

Signed by: _____

Date: _____

PROJECT MANAGER'S ACTION

☐ Request approved.

☐ Request approved subject to qualifications per attached documentation.

Approved by: _____

☐ Request denied.

☐ Refer Variation Order No: _____

Date: _____

Comments: _____

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 .

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect .
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect .

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701CMA .

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on AIA Document G714CMA . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect through Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
 - 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
 - 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and Construction Manager and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G703 and AIA Document G732 as form for Applications for Payment.

- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment .
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Sustainable design action plans, including preliminary project materials cost data.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.

14. Report of preconstruction conference.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.
 9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 10. Final liquidated damages settlement statement.
 11. Proof that taxes, fees, and similar obligations are paid.
 12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
 - 5. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

- A. RFI: Request for Information. Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination of Multiple Contracts: Each contractor shall cooperate with Project coordinator, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors and direction of Project coordinator to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:
 - a. DWG , Version , operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Autocad 2020. .
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Agreement form acceptable to Owner and Architect.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Architect and Construction Manager.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form bound in Project Manual .
1. Attachments shall be electronic files in PDF format.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or Construction Manager of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 5 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly .
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect and Construction Manager.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's and Construction Manager's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

- F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in Autocad 2020 .
 4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement .
 - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106 .
 5. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Construction Manager will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner , Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.

- h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises and existing building.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.
 - w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.
 - bb. Progress cleaning.
- 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Construction Manager will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Construction Manager will conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.

- 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Project Coordinator will conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of RFIs.
 - 14) Proposal Requests.
 - 15) Change Orders.
 - 16) Pending changes.
 2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

MICHAEL SHILALE ARCHITECTS, LLP

Send all RFI's in writing to Michael Shilale Architects, LLP at the above address/fax number. **Only this form will be accepted, and no questions will be entertained via telephone. By submitting this Request for Information, the Contractor is stating that they have performed a thorough review of the drawings and specifications and the information requested is not contained in the construction documents.**

Project:		RFI No.
MSA File No.:		
NYSED No.:		
Contractor:		
Contract for:	Hazardous Materials Abatement <input type="checkbox"/> Demolition <input type="checkbox"/> Site Construction <input type="checkbox"/> General Construction <input type="checkbox"/> Plumbing <input type="checkbox"/> Mechanical <input type="checkbox"/> Electrical <input type="checkbox"/> Other <input type="checkbox"/>	

Specification Reference:	Drawing Reference:
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Description, complete with backup information as needed to fully convey the issue:	<input type="checkbox"/> Sketch/Information Attached
Contractor's Proposed Solution:	<input type="checkbox"/> Sketch/Information Attached

Impact on Cost:	Impact on Schedule:
------------------------	----------------------------

Trades/Specialty Contractors Affected:
Trades/Specialty Contractors Coordinated With:

Submitted By:	Requested Date of Response:
----------------------	------------------------------------

Architect/Engineer's Response:

☐ ID No. _____ ☐ Attached
☐ Sketch/Information Attached

By: _____ **Date:** _____

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
 - 2. Section 014000 "Quality Requirements" for schedule of tests and inspections.
 - 3. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at weekly intervals.

F. Material Location Reports: Submit at weekly intervals.

G. Unusual Event Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion .
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 - 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
 - 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Work under More Than One Contract: Include a separate activity for each contract.
 - 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.

- d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 - 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion .
- 1. Temporary enclosure and space conditioning.
- F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- 1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.
- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and the Contract Time.
- H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate Final Completion percentage for each activity.
- I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain

compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

- J. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Testing and inspection.
 - 8. Accidents.
 - 9. Meetings and significant decisions.
 - 10. Unusual events.
 - 11. Stoppages, delays, shortages, and losses.
 - 12. Meter readings and similar recordings.
 - 13. Emergency procedures.
 - 14. Orders and requests of authorities having jurisdiction.
 - 15. Change Orders received and implemented.
 - 16. Construction Change Directives received and implemented.

17. Services connected and disconnected.
 18. Equipment or system tests and startups.
 19. Partial completions and occupancies.
 20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

- 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's and Construction Manager's final release or approval.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

SUBMITTAL PROCEDURES

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- a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow [15] days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.

- f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit 2 sets of Samples. Architect and Construction Manager will retain 1 Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- D. **Product Schedule:** As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. **Qualification Data:** Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. **Design Data:** Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. **Certificates:**
1. **Certificates and Certifications Submittals:** Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. **Installer Certificates:** Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. **Manufacturer Certificates:** Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. **Material Certificates:** Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. **Product Certificates:** Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. **Welding Certificates:** Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. **Test and Research Reports:**
1. **Compatibility Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
 2. **Field Test Reports:** Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 3. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 4. **Preconstruction Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 5. **Product Test Reports:** Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and 1 paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp . Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect and Construction Manager will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S AND CONSTRUCTION MANAGER'S REVIEW

- A. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required.
 - 1. PDF Submittals: Architect and Construction Manager will indicate, via markup on each submittal, the appropriate action .
 - 2. Paper Submittals: Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action .
- B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect and Construction Manager will discard submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Section 012100 "Allowances" for testing and inspection allowances.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 - 1. Mockups are used for one or more of the following:
 - a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.

- d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
 - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
 - E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
 - F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
 - I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.
- 1.4 DELEGATED DESIGN SERVICES
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
 - B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- 1.5 CONFLICTING REQUIREMENTS
- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
 - B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Mockup Shop Drawings:

1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports and documents as specified.

E. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award , and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent .

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.

5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- F. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:
 1. Provide test specimens representative of proposed products and construction.
 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 4. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 5. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
 3. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's and Construction Manager's approval of mockups before starting corresponding Work, fabrication, or construction.

- a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.

- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
 - 1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 - 2. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION


3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

 NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) <i>Note: The code listings below are not to be considered all inclusive.</i>
BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, and ; Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.	
School District North Rockland Central School District	Project Title HS Chiller Replacement and HVAC Upgrades
Building North Rockland High School	
SED Project # 50-02-01-06-0-0-016-037	Project Address 106 Hammond Road, Thiells, NY 10984
Architect/Engineer: Michael Shilale Architects, LLP	
Sign and Stamp:	
A/E Firm (or Dba): John Cirilli, AIA, LEED	
Phone 845-708-9200	
Date	
Comments:	

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction		Ch. 22					
1.	Material verification of high-strength bolts, nuts and washers.		X	AISC 360	1705.2 2204	<input checked="" type="checkbox"/>	
2.	Inspection of high-strength bolting.		X	AISC 360 ACI 318	1705.2 2204.2	<input checked="" type="checkbox"/>	
3.	Material verification of Structural Steel. Open Web Steel Joist and Girders. Basic protection of steel members, Seismic Resistance		X	AISC 360 ASTM A6, A514, A29 SJ100, 200 AISC 341	1705.2 2203, 2205 1705.2 2207	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
4.	Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E605, E736	1705.14 1705.15	<input type="checkbox"/>	
5.	Cold Formed Steel Construction- load bearing. Seismic Resistance			AISI S100, S220, S240 ANSI/SDI -NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211	<input type="checkbox"/> <input type="checkbox"/>	
6.	Material verification of weld filler materials.			AWS D1.1, D1.3	1705.2 2204.1	<input type="checkbox"/>	
7.	Inspection of welding:		X	ACI 318: 26.6.4	T 1705.3 2204	<input checked="" type="checkbox"/>	
	a. Structural steel		X	AWS D1.1, D1.3	1705.2	<input checked="" type="checkbox"/>	
	b. Reinforcing steel			AWS D1.1, D1.3	1705.3.1	<input type="checkbox"/>	
	c. Cold Formed Steel Deck			AISC S100, ASCE 7, 8	1705.2.2	<input type="checkbox"/>	
8.	Inspection of steel frame joint details.				1705.2	<input type="checkbox"/>	

INSPECTION AND TESTING Continuous & Periodic as Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B. Concrete Construction		Ch. 19					
1.	Inspection of reinforcing steel, including prestressing tendons, and verify placement.			Ch. 21, 22 ACI 318; Ch 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	<input type="checkbox"/>	
2.	Inspection of reinforcing steel bar welding.			ACI 318, AWS D1.4	T 1705.3	<input type="checkbox"/>	
3.	Inspection of anchors to be installed in concrete prior to and during placement.			ACI 318: 17.8.2, 17.8.2.4	T 1705.3	<input type="checkbox"/>	
4.	Verify use of required design mix.		X	ACI 318: Ch. 19, 26.4.3, 26.4.4	T 1705.3 1904 1908	<input checked="" type="checkbox"/>	
5.	Sampling fresh concrete: slump, air content, temperature, strength test specimens.			ASTM C172, C31 ACI 318: 26.5, 26.9, 26.10, 26.11	T 1705.3 1901 1905 1908	<input type="checkbox"/>	
6.	Inspection of placement for proper application techniques.			ACI 318: 26.5	T 1705.3	<input type="checkbox"/>	
7.	Inspection for maintenance of specified curing temperature and techniques.			ACI 318: 26.5	T 1705.3 1908 1909	<input type="checkbox"/>	
8.	Inspection of prestressed concrete.			ACI 318: 26.10	T 1705.3	<input type="checkbox"/>	
9.	Erection of precast concrete members.			ACI 318: 26.9	T 1705.3	<input type="checkbox"/>	
10.	Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.			ACI 318: 26.11.2	T 1705.3	<input type="checkbox"/>	
11	Inspection of formwork			ACI 318: 26.11.1.2 (b)	T 1705.3	<input type="checkbox"/>	

C. Masonry Construction				Ch. 21					
INSPECTION AND TESTING Continuous & Periodic as is Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.				CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
	L1 = Level 1 Inspection required for nonessential facilities. L2 = Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.					ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602 1705.4 2101 1604		
1.	Verify to ensure compliance:								
	a.	Proportions of site prepared mortar and grout.					1705.4 2103.2	<input type="checkbox"/>	
	b.	Placement of masonry units and construction of mortar joints.					1705.4 T 1705.3	<input type="checkbox"/>	
	c.	Location and placement of reinforcement, connectors, tendons, anchorages.					1705.45 2103.4 T 1705.3	<input type="checkbox"/>	
	d.	Prestressing technique.					1705.4	<input type="checkbox"/>	
		Grout space prior to grouting.					1705.4	<input type="checkbox"/>	
	e.	Grade and size of prestressing tendons and anchorages.					1705.4	<input type="checkbox"/>	
		Placement of grout.					1705.4	<input type="checkbox"/>	
	f.	Grout specs prior to grouting.					1705.4	<input type="checkbox"/>	
2.	Inspection program shall verify:								
	a.	Size and location of structural elements.					1704.5 1705.4	<input type="checkbox"/>	
	b.	Type, size, and location of anchors.					1705.4 T 1705.3	<input type="checkbox"/>	
	c.	Specified size, grade, and type of reinforcement.					1704.5	<input type="checkbox"/>	
	d.	Welding of reinforcing bars.					1704.5	<input type="checkbox"/>	
	e.	Cold/hot weather protection of masonry construction.					1704.5, 2104.3, 2104.4	<input type="checkbox"/>	
	f.	Prestressing force measurement and application.					1704.5	<input type="checkbox"/>	
3.	Verification accessory placement prior to grouting:						1704.5, 2105.2.2, 2105.3	<input type="checkbox"/>	
4.	Grout placement.						1704.5	<input type="checkbox"/>	
5.	Preparation of grout specimens, mortar specimens, and/or prisms.						1704.5, 2105.2.2, 2105.3	<input type="checkbox"/>	
6.	Compliance with documents and submittals.						1704.5	<input type="checkbox"/>	

INSPECTION AND TESTING Continuous & Periodic as is Defined by the BCNYS CHAPTER 17 All reports to be submitted to the owners representative for use, approval and record.		CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction		Ch. 23					
1.	Fabrication process of prefabricated Wood Structural Elements and assemblies.			Ch. 16 AWC, APA, CPA, DOC PS1, PS2	1704.6, 1705.5 2302, 2303 2304	<input type="checkbox"/>	
2.	High-load diaphragms Seismic Resistance				1704, 1705, 1704.6 2304, 2305 2306, 2307, 2308	<input type="checkbox"/>	
E. Soils		Ch. 18					
1.	Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing/ Water-Proofing			ASTM, NYS DOT OSHA Appendix J- BCNYS	1704, 1706 1803, 1804, 1805	<input type="checkbox"/>	
2.	Flood & Stormwater Hazards [per BCNYS 106]			<u>Local Highway Authority</u> <u>Flood Plain Admin.</u> Appendix G- BCNYS	1703 1610, 1611, 1612 1805.1.2.1	<input type="checkbox"/> <input type="checkbox"/>	
F. Specialized Foundations- Piers, Piles		Ch. 16					
1.	Deep Foundation Elements: Driven Piles Cast in Place Helical Piles				T 1705.7 T 1705.8 1705.7 1705.8 1705.9	<input type="checkbox"/>	
G. Exterior Wall Coverings		Ch. 14					
1.	Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials			ASTM E2568, E2273, E2570 E2393, E84 Ch. 16 NFPA 268, 275, 285, 286	1405, 1406, 1407, 1408 1704.2, 1705.12.5 1705.16	<input type="checkbox"/>	
H. Misc.							
1.	Access Floors and Storage Racks Other Architectural, MEP Components Seismic Resistance				1705.12	<input type="checkbox"/>	
2.	In-Situ Testing				1604.6, 1708	<input type="checkbox"/>	
3.	Pre-Construction Load Testing				1604.7, 1709	<input type="checkbox"/>	
4.	Fire Resistant Penetrations & Joints Fire Stops Testing for Smoke Control			Ch. 7 ASTM E119 UL 263	1705.17 1705.18	<input type="checkbox"/>	
5.	Pre-Submission: Inventory of all Fire-Resistant-Rated Construction- Level 2 Alterations and greater [per BCNYS 106]	X		verification required EBCNYS Ch. 3 C. of E. 155 Regulations.	FCNYS 701.6 BCNYS 703.7 19CRR-NY XXXII	<input type="checkbox"/>	
6.	Pre-Submission: Hazardous Material Survey Water Quality Survey	X X		verification required <u>ACM Letter- Certificate</u> C. of E. 155 Regulations.	US-EPA NYS-DOH	<input type="checkbox"/>	
7.	Other:					<input type="checkbox"/>	

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
T. A/E INSPECTIONS						
1 Foundation Inspections						
a. Footings					<input type="checkbox"/>	
b. Foundation Walls					<input type="checkbox"/>	
c. Slabs On grade					<input type="checkbox"/>	
2 Structural Elements Inspections						
a. Super Structure					<input checked="" type="checkbox"/>	
b. Interior Partition					<input type="checkbox"/>	
3 Electrical Inspections						
a. Rough-In					<input checked="" type="checkbox"/>	
b. Final					<input checked="" type="checkbox"/>	
4 HVAC System Inspections						
a. Fuel burning heating appliances					<input checked="" type="checkbox"/>	
b. Chimneys, flues and gas vents					<input checked="" type="checkbox"/>	
c. Unit Ventilation/ Ventilation Systems/Air Conditioning Systems					<input checked="" type="checkbox"/>	
5 Plumbing Systems Inspections						
a. Below-Grade Plumbing					<input type="checkbox"/>	
b. Rough Plumbing					<input type="checkbox"/>	
c. Finish Plumbing					<input type="checkbox"/>	
6 Fire Protection & Detection Inspections						
a. Sprinkler System						
(i.) Rough-In					<input type="checkbox"/>	
(ii.) Final					<input type="checkbox"/>	
b. Alarm System						
(i.) Rough-In					<input checked="" type="checkbox"/>	
(ii.) Final					<input checked="" type="checkbox"/>	
7 Exiting Features Inspection						
a. Rough-In					<input checked="" type="checkbox"/>	
b. Final					<input checked="" type="checkbox"/>	
8 Energy Code Compliance					<input checked="" type="checkbox"/>	
9 Elevator Inspection			ASME A17.1		<input type="checkbox"/>	
10 Final Inspection					<input checked="" type="checkbox"/>	

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms, including "requested," "authorized," "selected," "required," and "permitted," have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms, including "shown," "noted," "scheduled," and "specified," have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Section 011200 "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
 - 3. Section 012100 "Allowances" for allowance for metered use of temporary utilities.

1.2 USE CHARGES

- A. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.
- B. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- C. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
- D. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.

5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with Owner.

1.4 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices:
 1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 13 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."

3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
 - D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 - E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
 - F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
 - G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
 - H. Waste Disposal Facilities:
 1. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
 - I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
 - K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.
 - L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
 - B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 011000 "Summary."
 - C. Temporary Erosion and Sedimentation Control:

1. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with erosion- and sedimentation-control Drawings .
 - a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection:
 1. Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- F. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 012100 "Allowances" for products selected under an allowance.
 - 3. Section 012300 "Alternates" for products selected under an alternate.
 - 4. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 5. Section 014200 "References" for applicable industry standards for products specified.
 - 6. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other

requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Resolution of Compatibility Disputes between Multiple Contractors:
 - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect through Construction Manager in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 016400 - OWNER FURNISHED PRODUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Requirements for installing Owner-furnished products, including providing miscellaneous items and accessories for a complete, functioning installation.

1.3 RELATED SECTIONS

- A. Section 015800 - Project Identification and Signage: Owner-furnished, Contractor-installed (OFICI) temporary signage.

1.4 PRODUCT HANDLING

- A. Protection: Contractor shall use means necessary to protect the materials of this Section before, during, and after installation and to protect completed Work, including products installed by others.
- B. Replacements: In the event of damage, Contractor shall immediately repair all damaged and defective Work to satisfaction of Owner's Representative, at no change in Contract Time and Contract Sum.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFICI) PRODUCTS

- A. Products Identified with Contractor Responsibility for Installation:

1. Contractor shall verify mounting and utility requirements for accepted products.
2. Contractor shall provide mounting and utility rough-ins for OFICI products.
 - a. Rough-in locations, sizes, capacities and similar type shall be as indicated and required by product manufacturers.
 - b. If the Owner substitutes items similar to those scheduled there shall be no change in rough-in cost, unless substitution occurs after rough-in has been completed or rough-in involves other mounting requirements, utilities of different capacity than those required by item originally specified.
3. For items Designated to Be Owner- or Vendor-Furnished: Owner or its vendor will furnish manufacturer's literature or information, shop drawings, or appropriate information for preparing required shop drawings.

- B. Installation Instructions: Approved manufacturer's printed descriptions, specifications and recommendations shall govern the Work, unless specifically indicated otherwise.
- C. Electrical Components: Contractor shall comply with requirements specified in Division 26 - Electrical, including National Electrical Code (NEC).
- D. Plumbing and HVAC Components: Contractor shall comply with requirements specified in Division 22 – Plumbing and Division 23 – HVAC.

2.2 OWNER-FURNISHED/CONTRACTOR-INSTALLED PRODUCT REQUIREMENTS

- A. Products Furnished by Owner and Installed by Contractor:
 - 1. Contractor shall coordinate delivery of OFCI products. Owner will furnish products to coincide with construction schedule.
 - 2. Owner will:
 - a. Furnish standard integral components of products.
 - b. Deliver products to site. Contractor shall assist Owner in offloading products.
 - 3. The Contractor shall:
 - a. Receive products at site and give written receipt for product at time of delivery, noting visible defects and omissions; if such declaration is not given, the Contractor shall assume responsibility for such defects and omissions.
 - b. Store products until ready for installation and protect from loss and damage.
 - c. Uncrate, assemble and set products in place.
 - d. Install products in accordance with manufacturer's recommendations, instructions and shop drawings under supervision of manufacturer's representative where specified, supplying labor and material required and making mechanical, plumbing and electrical connections necessary to operate equipment.
 - e. Where so specified, installation shall be only by installer approved by manufacturer. If known, approved installer is identified on the Drawings or in the Specifications.
 - f. Provide and install backing for all products weighing 20 pounds or more.
 - g. Treat all Owner or Vendor supplied products with the same care as all Contractor furnished items.
- B. Products Furnished and Installed by Owner:
 - 1. Contractor prepare; vendor install:
 - a. General: Contractor shall coordinate deliveries of vendor-supplied products. Vendor will furnish products to coincide with the construction schedule.
 - b. Vendor will:
 - 1) Furnish standard integral components of products.
 - 2) Deliver products to site.
 - 3) Make connections to roughed-in utilities.
 - c. Contractor shall:
 - 1) Receive products at site and give written notice of receipt of each product at time of delivery, noting visible defects.

- 2) Provide rough-in of utility products in accordance with manufacturer's recommendations, instructions and shop drawings under supervision of the manufacturer's representative where specified.
- 3) Provide and install backing for all products weighing 20 pounds or more.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to commencing Work, Contractor shall verify that Work specified in other Sections has been properly completed and installed as specified to allow for installation of all materials and methods required of this Section.
2. Contractor shall verify that new and existing products and conditions are satisfactory for installation or relocation of OFCI products. If unsatisfactory conditions exist, do not commence the installation until such conditions have been corrected.

B. Discrepancies:

1. In the event of discrepancy, Contractor shall immediately notify the Owner's Representative.
2. Contractor shall not proceed with installation in areas of discrepancy until all such discrepancies have been resolved.

3.2 INSTALLATION

- A. Contractor shall relocate and reinstall existing products in accordance with Contract Documents and reviewed shop drawings, original manufacturer's instructions and recommendations if applicable and as directed.
- B. Contractor shall install Owner-furnished products in accordance with reviewed shop drawings and manufacturer's printed instructions, as applicable.

3.3 ADJUSTING AND CLEANING

- A. Contractor shall adjust products as necessary and as directed by Owner's Representative.
- B. Contractor shall clean all new and relocated OFCI products.
- C. Contractor shall protect OFCI products from damage until Contract Completion.

3.4 LIST OF OWNER FURNISHED PRODUCTS

- A. Owner will provide HVAC Contractor with rooftop unit RTU-D1, RTU-D2, RTU3, RTU4, RTU5, and RTU6 for HVAC contractor to install.
- B. Owner will contract with Siemens via state contract for controls installation and BMS integration.

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
1. Construction layout.
 2. Field engineering.
 3. Installation.
 4. Cutting and patching.
 5. Coordination of Owner's portion of the Work.
 6. Progress cleaning.
 7. Starting and adjusting.
 8. Protection of installed construction.
 9. Correction of the Work.
- B. Related Requirements:
1. Section 011000 "Summary" for coordination of Owner-furnished products , Owner-performed work , Owner's separate contracts, and limits on use of Project site.
 2. Section 013300 "Submittal Procedures" for submitting surveys.
 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
 5. Section 024116 "Structure Demolition" for demolition and removal of complete building.
 6. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site .
1. Prior to submitting cutting and patching plan , review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

B. Layout Conference: Conduct conference at Project site .

1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Professional surveyor responsible for performing Project surveying and layout.
 - c. Professional surveyor responsible for performing site survey serving as basis for Project design.
2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor .

B. Certified Surveys: Submit two copies signed by land surveyor .

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."

C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect through Construction Manager in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

- D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb, and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.
 - 1. Provide temporary facilities required for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.
 - 2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

EXECUTION

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for coordination of responsibilities for waste management.
 - 2. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
 - 3. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice of Award.

1.6 INFORMATIONAL SUBMITTALS

- A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.

3.3 ATTACHMENTS

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final Completion procedures.
 - 3. List of incomplete items.
 - 4. Submittal of Project warranties.
 - 5. Final cleaning.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements to train Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.
 5. Submit testing, adjusting, and balancing records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel Electronic File: Architect, through Construction Manager, will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit on digital media acceptable to Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - q. Clean strainers.
 - r. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Systems and equipment operation manuals.
 - 3. Systems and equipment maintenance manuals.
 - 4. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
 - 2. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 3. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
 - 1. Submit on digital media acceptable to Architect . Enable reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.

- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists,

assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
- D. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.8 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- I. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

1.9 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for coordinating Project Record Documents covering the Work of multiple contracts.
 - 2. Section 017300 "Execution" for final property survey.
 - 3. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 4. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned Record Prints and one set(s) of file prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files and one paper copies of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.4 RECORD DRAWINGS

- A. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect through Construction Manager for resolution.
 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and Construction Manager.
 - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 3. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file .

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file .

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Construction Manager's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor .
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner , through Construction Manager, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 019113**GENERAL COMMISSIONING REQUIREMENTS****PART 1 - GENERAL****1.01 SUMMARY**

- A. This Section specifies the Contractor's responsibilities in the commissioning process. Commissioning requires the participation of the Contractor to ensure that all systems are operating in a manner consistent with the Contract Documents.
- B. The commissioning process integrates the traditionally separate functions of system documentation, equipment startup, performance testing and training. Commissioning during the construction phase is intended to achieve the following specific objectives in accordance with the Contract Documents:
 - 1. Verify and document that applicable equipment and systems are installed according to the manufacturer's recommendations, contract requirements, and industry standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems.
 - 3. Verify and document that O&M documentation is complete.
 - 4. Verify and document that the Facility operating personnel are properly trained.
- C. The systems and equipment to be commissioned are listed in this Section. The Contractor's general commissioning requirements and coordination are detailed in this Section. Specific requirements for commissioning of each system or piece of equipment are detailed in the specification Section for the individual systems or pieces of equipment. A detailed description of the overall commissioning process is included in the appendix.
- D. The commissioning process does not reduce the responsibility of the Contractor to provide finished and fully functional systems and equipment.

1.02 SYSTEMS TO BE COMMISSIONED

- A. The following systems will be commissioned in this project. Specific requirements for the commissioning of each system are included in the related specification Section.
 - 1. HVAC Work Contract:
 - a. Air Handling Units
 - d. Temperature Control System
 - g. HVAC Piping
 - i. Ductwork Distribution System
 - l. Testing and Balancing
- B. Example Commissioning Documents: Example Pre-Functional Checklists and Functional Test Procedures are provided following the specification Sections of equipment and systems that are scheduled to be commissioned. These documents are included to provide the Contractor examples of the type of documentation that will be

required as part of the commissioning process. Equipment and system specific Pre-Functional Checklists and Functional Test procedures will be developed by the Commissioning Authority based on approved submittals, and then will be provided to the Contractors.

1.03 DEFINITIONS

- A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.
- B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes in accordance with the Contract Documents.
- C. Commissioning authority (CA): An independent agent responsible for the direction and coordination of the commissioning activities. The CA responsible to the Owner's Representative.
- D. Commissioning Plan: An overall plan that provides the structure, schedule and coordination planning for the commissioning process.
- E. Commissioning Team: The members of the commissioning team consist of the Commissioning Authority, the Owner's Representative, the Contractor, the architect and design engineers. The owner and the building or plant operator/engineer also may be members of the commissioning team.
- F. Deferred Functional Tests: Functional tests that are performed after substantial completion, due to partial occupancy, seasonal requirements, design or other site conditions that prevent the test from being performed prior to substantial completion.
- G. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.
- H. Factory Testing: Testing of equipment on-site or at the factory by factory personnel.
- I. Functional Performance Test (FT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The CA develops the functional test procedures in sequential written form. The CA coordinates, oversees and documents the actual testing. The Contractor performs the functional tests. FTs are performed after prefunctional checklists and startup are complete.
- J. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order to minimize the total construction time. Commissioning shall be provided for each phase according to the schedule for that phase. Some repetition and/or remobilization may be required.
- K. Prefunctional Checklist (PC): A list of items to inspect and component tests to conduct to verify proper installation of equipment prior to initiating functional testing.

- L. Startup: The initial starting or activating of dynamic equipment, including executing prefunctional checklists.

1.04 COORDINATION

- A. The CA is hired by the Mechanical Contractor and works for the Owner. The CA directs and coordinates the commissioning activities. All members of the commissioning team shall work together to fulfill their contractual responsibilities and meet the objectives of the Contract Documents.
- B. The CA will work with the Contractor according to established protocols to schedule the commissioning activities. The Contractor shall integrate all commissioning activities into the approved progress schedule. All parties will address scheduling problems and make necessary notifications and changes in a timely manner in order to expedite the commissioning process and maintain the approved progress schedule.

1.05 COMMISSIONING PROCESS

- A. Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process. Following the initial commissioning scoping meeting the CA will update the plan which is then considered the “final” plan, although it may be revised as the project progresses.
- B. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur. A more detailed description of the commissioning process can be found in the Appendix.
 - 1. Commissioning during construction begins with a scoping meeting conducted by the CA where the commissioning process is reviewed with the Commissioning Team.
 - 2. Additional meetings will be required throughout construction, scheduled by the Owner’s Representative, to plan, scope, coordinate, and schedule future activities and to resolve problems. When possible, commissioning meetings will be scheduled immediately following construction meetings.
 - 3. Equipment documentation is submitted to the CA during the submittal process, including detailed start-up procedures.
 - 4. The CA works with the Contractor to develop startup activity lists and startup documentation. The CA provides prefunctional checklists to be completed by the Contractor during the startup process.
 - 5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels. In each case prefunctional checklists are completed, submitted, and approved before functional testing begins.
 - 6. The Contractor executes and documents the prefunctional checklists, and provides notification to the Owner’s Representative and the CA. The Contractor performs startup and initial checkout. The CA documents that the checklists and startup were completed according to the approved plans.
 - 7. The CA develops specific equipment and system functional performance test procedures. The Contractor reviews the procedures and submits suggestions or comments. Procedures are finalized by the CA.
 - 8. The procedures are executed by the Contractor, under the direction of the CA.

9. Items of non-compliance in material, workmanship, or setup are corrected and retested at the Contractor's expense. The Contractor is responsible for providing all resources, manpower, and materials necessary to rectify deficiencies as per requirements of the approved schedule.
10. The O&M documentation prepared by the Contractor is reviewed for completeness by the CA.
11. Commissioning is completed before Substantial Completion.
12. The CA reviews, pre-approves and coordinates the training provided by the Contractor and verifies that it was completed.
13. Deferred testing is conducted, as specified or required.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor's commissioning responsibilities are as follows (all references apply to commissioned systems and equipment only):
 1. Construction and Acceptance Phase:
 - a. Attend the commissioning scoping meeting and other necessary meetings scheduled by the Owner's Representative to facilitate the commissioning process.
 - b. Facilitate the coordination of the commissioning work by the CA, and with the CA ensure that commissioning activities are being scheduled into the approved progress schedule.
 - c. Provide detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, factory test reports, and full warranty information, including all responsibilities of the Owner to keep the warranty in force. The installation, start-up and checkout materials that are actually shipped with the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the commissioning process.
 - d. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
 - e. Ensure that all subcontractors execute their commissioning responsibilities according to the Contract Documents and approved progress schedule.
 - f. Assist in the process of writing detailed test procedures by clarifying the operation and control of commissioned equipment.
 - g. Review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
 - h. Develop a full start-up and testing plan using manufacturer's start-up procedures and the prefunctional checklists from the CA for all commissioned equipment. Submit to the CA for review and approval prior to startup.
 - i. During the startup and initial checkout process, execute all portions of the prefunctional checklists for all commissioned systems and equipment. Verify that system installations include all ports, gages, thermometers, access doors, valves, etc., required for specified functional performance testing.
 - j. Provide all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment.

- k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
 - l. Address incomplete Work before functional performance testing.
 - m. Provide skilled technicians to execute startup of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
 - n. Provide skilled technicians to perform functional performance testing under the direction of the CA for specified equipment. Provide Manufacturer's Representative as required and as specified in the Specification. Assist the CA in interpreting the monitoring data, as necessary.
 - o. Correct deficiencies (differences between specified and observed performance) as directed by the Owner's Representative.
 - p. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions. Provide a copy of the O&M manuals and submittals of commissioned equipment to the CA for review and approval.
 - q. Provide training as specified.
 - r. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
2. Warranty Period:
- a. Execute seasonal or deferred functional performance testing in accordance with the specifications
 - b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractor.
- B. Specified special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment shall be provided by the Contractor, and turned over to the facility at the completion of the Work.
- C. Datalogging equipment and software required to test equipment will be provided by the Contractor, but shall not become the property of the Owner's Representative.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.
- E. At 1 year after substantial completion, Contractor shall test and check calibration of all installed CO2 sensors. Re-calibrate sensors to ensure target per person ventilation rates are met and maintained.

PART 3 - EXECUTION

3.01 MEETINGS

- A. Scoping Meeting. Prior to the commencement of construction, the CA will schedule, plan and conduct a commissioning scoping meeting with the Commissioning Team.
- B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with the Contractor, appropriate sub-contractors and suppliers, the Owner's Representative, and the Owner's Representative.

3.02 START-UP, PREFUNCTIONAL CHECKLISTS, AND INITIAL CHECKOUT

- A. Prefunctional checklists and initial checkout shall ensure that the equipment and systems are hooked up and operational. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of systems or equipment.
- B. Start-up and Initial Checkout Plan. The CA shall assist the commissioning team members responsible for startup of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer's recommended procedures have been completed.
- C. Execution of Prefunctional Checklists and Startup.
 - 1. Four weeks prior to startup, the Contractor shall schedule startup and checkout with the Owner's Representative.
 - 2. The Contractor shall execute startup and provide the CA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.

3.03 FUNCTIONAL PERFORMANCE TESTING

- A. Development of Test Procedures. Using the requirements in the specifications, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. The Contractor shall provide assistance to the CA in developing the procedures. Prior to testing, the CA shall provide a copy of the test procedures to the Contractor who shall review the tests for feasibility, safety, equipment and warranty protection.
- B. Functional performance testing shall document that each system is operating in accordance with the Contract Documents. During the testing process, areas of deficient performance shall be identified. Deficiencies shall be corrected by the Contractor and functional testing shall be re-scheduled. The Contractor shall be responsible for all costs associated with re-testing for functional performance.
- C. Each system shall be operated through all modes of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

- D. Test Methods. Each function and test shall be performed under conditions that simulate actual conditions as closely as possible. The Contractor shall execute the test and shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At the completion of the test, the Contractor shall return all building equipment and systems affected by these temporary modifications to their pre-test condition.

3.04 OPERATION AND MAINTENANCE MANUALS

- A. Standard O&M Manuals. The specific content and format requirements for the standard O&M manuals are detailed in section 017823.
- B. The Contractor shall compile and prepare commissioning documentation for all equipment and systems and include this information in the O&M manuals.

3.05 TRAINING

- A. The Contractor shall be responsible for coordinating, scheduling, and documenting that all required training has been completed successfully.
- B. The Contractor shall have the following training responsibilities:
 - 1. Provide a training plan two weeks before the planned training.
 - 2. Provide comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
 - 3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment.
 - 4. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
 - 5. Training shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, and any emergency procedures.
 - c. Discussion of relevant health and safety issues and concerns.
 - d. Discussion of warranties and guarantees.
 - e. Common troubleshooting problems and solutions.
 - f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
 - g. Discussion of any peculiarities of equipment installation or operation.

3.06 DEFERRED TESTING

- A. Unforeseen Deferred Tests. If any check or test cannot be completed due to project conditions, required occupancy condition or other deficiency, execution of checklists and

functional testing may be delayed upon approval of the Owner's Representative. These tests will be conducted in the same manner as the seasonal tests as soon as possible.

- B. Seasonal Testing. Seasonal testing (tests delayed until weather conditions are closer to the system's design conditions) shall be completed as part of this contract. Make any final adjustments to the O&M manuals and as-builts resulting from information gained during testing.

END OF SECTION

SECTION 020800 ASBESTOS ABATEMENT PROCEDURES**PART I – GENERAL****1.01 DESCRIPTION**

- A. All work under this contract shall be performed in strict accordance with the specifications and all applicable laws for asbestos removal projects. The Abatement Contractor shall furnish all labor, materials, supervision, services, insurance and equipment necessary for the complete and total removal of Asbestos-containing Materials (ACM) as described herein, in attachments to the specification, Job Specific Variance(s) and/or as directed by North Rockland CSD (herein-after the "Owner") and/or the Owners Representative(s) to support the ***HS Chiller Replacement & HVAC Upgrades Project***.
- B. Abatement Contractor shall provide for personnel air monitoring to satisfy OSHA regulation 29 CFR Parts 1926.1101(f). All work performed shall be in strict accordance with applicable provisions and regulations promulgated under New York State Department of Labor, Industrial Code 56 (ICR-56).
- C. The Abatement Contractor shall satisfy the requirements for asbestos projects issued by the New York State Department of Labor concerning licensing and certification; notification; equipment; removal and disposal procedures; engineering controls; work area preparation; decontamination and clean-up procedures; and personnel air monitoring.
- D. The Abatement Contractor shall be responsible for submittal of asbestos project notification(s) and applicable fees to EPA and NYSDOL concerning this project. Project notification(s) shall be made for the cumulative total of ACM to be removed as required by ICR-56-3.4. Work practices for each individual work area established shall be consistent with the quantity of ACM contained within that work area as defined in ICR-56-2.
- E. The scope of work under this contract shall include the following:
 - 1. All asbestos-containing materials (ACM) shall be removed in accordance with these specifications. The Abatement Contractor is responsible for field verification of estimated quantities, locations and other site conditions that may affect work.
 - 2. All fixed objects remaining within the work area(s) shall be protected as required by Title 12 NYCRR Section 56-7.10(b) and as described in these specifications.
 - 3. The containerization, labeling and disposal of all asbestos waste in accordance with applicable city, state and federal regulations and these specifications.
 - 4. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to, ceiling tiles, ceiling finishes, wall finishes and/or floor finishes, etc.
 - 5. The Abatement Contractor shall be responsible for any and all demolition required to access materials identified in scope of work and on associated drawings.
 - 6. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner(s) immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. If the Abatement Contractor removes additional asbestos prior to the order to proceed the additional work will not be acknowledged.
 - 7. Permissible working hours shall be Monday through Friday 7:00 A.M. to 5:00 P.M. and/or as defined by the Owner(s) and/or Owner's Representative(s). Holidays shall be considered weekends and not included for working days. Upon written approval from the Owner, the Abatement Contractor may work past these hours. The Abatement Contractor will incur any and all costs associated for work performed beyond the defined schedule including, but not limited to: abatement activities, project/air monitoring, custodial/staffing labor, overtime, mobilizations, etc.
 - 8. The building will be turned over to the Abatement Contractor as is. At that time, all electrical services and HVAC systems in the proposed work areas will be shut down. Electricity and water supply will be maintained in the

building for use by the Abatement Contractor. The Abatement Contractor is responsible for securing all power in the work area(s) and establishing all temporary GFCI hookups necessary to complete his work.

9. The Abatement Contractor shall remove all identified Asbestos-containing Materials (ACM) to building substrate(s); in areas indicted. Subsequent to final air clearances, the substrate(s) shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.
10. The Abatement Contractor must coordinate location of waste containers with the Facility and the Owner. Deliveries and storage of equipment must be coordinated with the Facility and the Owner.
11. All "Large" and "Small" asbestos abatement projects, as defined by 12 NYCRR56 shall not be performed while the building is occupied. The term "building" 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 exists that do not pass through the occupied portion(s) and ventilation systems must be physically separated and sealed at the isolation barriers.

1.02 PRE-CONTRACT SUBMITTALS

Within three (3) days after bids are opened, the three (3) apparent low bidders shall be required to submit the following documentation:

A. Resume': Shall include the following:

1. Provide a list of projects of similar nature performed within the past two (2) years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number, include location of project and date of completion.
2. Abatement Contractor license issued by New York State Department of Labor for asbestos work in accordance with ICR-56-3.
3. A list of owned equipment available to be used in the performance of the project.
4. The number of years engaged in asbestos removal.
5. An outline of the worker training courses, and medical surveillance program conducted by the Abatement Contractor.
6. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.
7. Documentation to the satisfaction of the Owner pertaining to the Abatement Contractor's financial resources available to perform the project. Such data shall include, but not be limited to, the firm's balance sheet for the last fiscal year.

B. Citations/Violations/Legal Proceedings

1. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous asbestos abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.
2. Answer the question: "Has your firm or its agents been issued a Stop Work order on any project within the last two years?" If "Yes" provide details as discussed above.
3. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitrations arising out of your performance on Asbestos Abatement Contracts?" If "Yes" provide details as discussed in 1. above.
4. Describe any liquidated damages assessed within the last two years.

C. Preliminary Schedule

1. Provide a detailed schedule including work dates, work shift times, estimate of manpower to be utilized and the start and completion date for completion of each major work area.

1.03 DOCUMENTATION

A. The Abatement Contractor shall be required to submit the following and receive the Consultant's approval prior to commencing work on this project:

1. Provide documentation of worker training for each person assigned to the project. Documentation shall include copies of each workers valid New York State asbestos handler certificates (for those employees who may perform asbestos removal), documentation of current respirator fit test and current OSHA required training and medical examination.
2. The attached "Asbestos Employee Medical Examination Statement" and "Asbestos Employee Training Statement" forms shall be completed, signed and submitted for each worker assigned to the project. Records of all employee training and medical surveillance shall be maintained for at least forty (40) years. Copies of the records shall be submitted to the Consultant prior to commencement.
3. The Abatement Contractor shall submit proof of a current, valid license issued by the New York State Department of Labor pursuant to the authority vested in the Commissioner by section 906 of the Labor Laws, and that the employees performing asbestos related work on this project are certified by the State of New York as required in Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York latest edition. Copies of all licenses shall be submitted prior to the commencement of the project.
4. The Abatement Contractor shall submit a written respiratory protection program meeting the requirements of 29 CFR 1910.134 to the Consultant.
5. The name, address, social security number and NYS DOL certificate number of the person(s) who will supervise the asbestos project.
6. The name and address of the deposit or waste disposal site or sites where the asbestos materials are to be deposited or disposed of. This site must be approved by the Owner. The manifesting procedure must also be specified.
7. The name, address and New York State Dept. of Environmental Conservation ID Number of any transporters that are to be used to transport waste.
8. A written Standard Operation Procedure (SOP) that is designed and implemented to maximize protection against human exposure to asbestos dust. The SOP shall take into consideration the workers, visitors, building employees, general public and environment. As a minimum the procedures must include the following:
 - a. Security for all work areas on an around-the-clock basis against unauthorized access.
 - b. Project organization chart including the phone numbers of at least two responsible persons who shall be authorized to dispatch men and equipment to the project in the event of an emergency; including weekends.
 - c. Description of protective clothing and NIOSH approved respirators to be used.
 - d. Description of all removal methods to be used, including HEPA air filtration and decontamination sequence with special emphasis on any procedure that may deviate from these specifications.
 - e. A list of manufacturers' certificates stating that all vacuums, negative air filtration equipment, respirators and air supply equipment meet OSHA and EPA requirements.
 - f. A list of all materials proposed to be furnished and used under this contract.
 - g. Emergency evacuation procedures in the event of fire, smoke or accidents such as injury from falling, heat exposure, electrical shock, etc.
 - h. The name, address and ELAP number of the New York State Department of Health Certified Analytical Testing Laboratory the Contractor proposes to use for the OSHA monitoring.

9. A detailed plan, in triplicate, for the phasing of the project, division of work areas and location of decontamination facilities, waste containers and temporary office.
 10. Work schedule, identifying firm dates and completion for actual areas. Bar chart or critical path chart indicating phases is required.
- B. The Abatement Contractor shall post their NYS DOL contractor's license and maintain a daily log documenting the dates and time of the following items within each personal decontamination unit:
1. Meetings; purpose, attendants, discussion (brief)
 2. Sign-in and sign-out of all persons entering the work area including name, date, time, social security number, position or function and general description of daily activity.
 3. Testing of barriers and enclosure systems using smoke tubes prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.
 4. Inspection of all plastic barriers, twice daily, by the asbestos supervisor.
 5. Loss of enclosure integrity; special or unusual events, barrier breaches, equipment failures, etc.
 6. Daily cleaning of enclosures.
 7. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.
- C. Documentation with confirmation signature of Consultant's representative of the following shall be provided by the Abatement Contractor at the final closeout of the project.
1. Testing of barriers and enclosure systems using smoke tubes shall be performed prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.
 2. Inspection of all plastic barriers.
 3. Removal of all polyethylene barriers.
 4. Consultant's inspections prior to encapsulation.
 5. Removal of waste materials.
 6. Decontamination of equipment (list items).
 7. Consultant's final inspection/final air tests.
- D. The Abatement Contractor shall provide records of all project information, to include the following which shall be submitted upon completion of the project and prior to approval of the Abatement Contractor's payment application:
1. The location and description of the abatement project.
 2. The name, address and social security number of the person(s) who supervised the asbestos project.
 3. Certified payroll documentation Pursuant to Article 8, Section 220 of the NYS Labor Law
 4. Copies of EPA/NYS DOL Asbestos Certificates for all Workers and Supervisors employed on the Project.
 5. Copies of Medical Approval and Respirator Fit Testing for all Asbestos Workers and Supervisors employed on the Project.

6. Copies of Abatement Contractors Daily Sign-In Sheets & Logs for persons entering and leaving the work area. – Title 12 NYCRR Part 56-7.3.
7. Copies of Abatement Contractor's personal air sampling laboratory results.
8. The amounts and type of asbestos materials that was removed, enclosed, encapsulated, or disturbed.
9. The name and address of the deposit or waste disposal site or sites where the asbestos waste materials were deposited or disposed of and all related manifests, receipts and other documentation associated with the disposal of asbestos waste.
10. The name and address of any transporters used to transport waste and all related manifests, receipts and other documentation associated with the transport of asbestos waste.
11. All other information that may be required by state, federal or local regulations.
12. Copy of the Supervisor's Daily Project Log of events as described in 1.03 B, above.

1.04 NOTIFICATIONS AND PERMITS

A. The Abatement Contractor shall be required to prepare and submit notifications to the following agencies at least ten (10) days prior to the commencement of the project:

1. Asbestos NESHAPS Contact
U.S. Environmental Protection Agency
NESHAPS Coordinator, Air Facilities Branch
26 Federal Plaza
New York, New York 10007
(212) 264-7307
2. State of New York Department of Labor
Division of Safety and Health
Asbestos Control Bureau
State Office Building Campus, Building 12, Room 454
Albany, New York 12240
3. Owner(s): North Rockland CSD
65 Chapel Street
Garnerville, NY 10923
ATTN: Michael Senno, Central Office Administrator
Ph. (845) 942-3028
E-mail. msenno@northrockland.org
4. Environmental Consultant(s): Quality Environmental Solutions & Technologies, Inc. (QuES&T)
1376 Route 9
Wappingers Falls, New York 12590
ATTN: Rudy Lipinski, Director of Field Operations
Ph. (845) 298-6031
Fx. (845) 298-6251
E-mail. rlipinski@qualityenv.com

B. The notification shall include but not be limited to the following information:

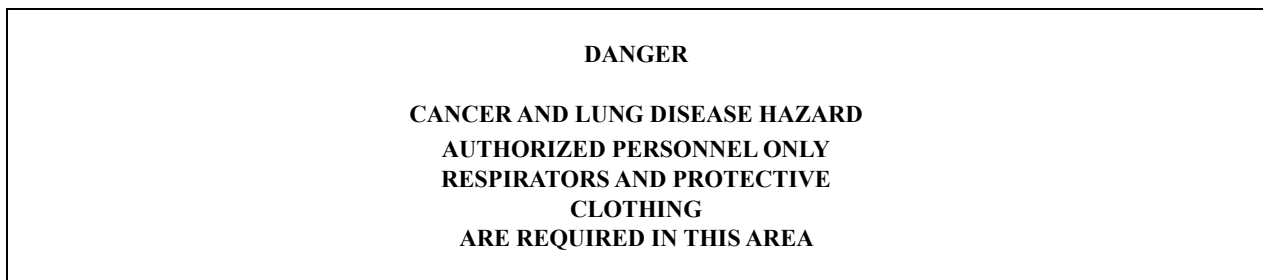
1. Name and address of Owner.
2. Name, address and asbestos handling license number of the Abatement Contractor.
3. Address and description of the building, including size, age, and prior use of the building or area; the amount, in square feet or linear feet of asbestos material to be removed; room designation numbers or other local information where asbestos material is found, including the type of asbestos material (friable or non-friable).
4. Scheduled starting and completion dates for removal.

5. Methods to be employed in abating asbestos containing materials.
6. Procedures and equipment, including ventilating/exhaust systems, that will be employed to comply with the Code of Federal Regulation (CFR) Title 40, Part 61 of the U.S. Environmental Protection Agency.
7. The name and address of the carting company and of the waste disposal site where the asbestos waste will be deposited.

NOTE: Notifications shall be submitted using standard forms as may be used by the respective agency.

For DOL (NYS) include "Asbestos Project Notification" form (DOSH-483) with proper fee, if required. For EPA include "Notification of Demolition and Renovation"; 40 CFR Part 61.

- C. The Abatement Contractor shall secure any permits required by the city, town, county, or state that may be required and the cost for obtaining the permit shall be included in his base bid.
- D. The Abatement Contractor shall erect warning signs around the work space at every point of potential entry into the work area in accordance with OSHA 1926.58k (2), (i). These signs shall bear the following information:



- E. The Abatement Contractor shall post at entrances to the work place and immediate adjacent areas, notifications to building occupants which include the name and license number of the contractor, project location and size, amount and type of ACM, abatement procedures, dates of expected occurrence and name and address of the air monitor and laboratory in compliance with ICR 56-3.6.
- F. The Abatement Contractor shall post a list of emergency telephone numbers at the job site which shall include the Owner's Representative, police, emergency squad, local hospital, Environmental Protection Agency, N.Y. State Department of Labor, Occupational Safety and Health Administration and the local Department of Health.

1.05 APPLICABLE STANDARDS

Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effects (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith. Resolution of overlapping and conflicting requirements, which result from the application of several different industry standards to the same unit of work, shall be by adherence to the most stringent requirement.

- A. Applicable standards listed in these Specifications form a part of this Specification and include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. ANSI:
American National Standards Institute
1430 Broadway
New York, New York 10018
2. ASHRAE:
American Society for Heating, Refrigerating
and Air Conditioning Engineers

- NE 1791 Tullie Circle
Atlanta, Georgia
- 30329 3. ASTM:
American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103
4. CFR
Code of Federal Regulations Available
from Government Printing Office
Washington, District of Columbia 20402
5. CGA
Compressed Gas Association
1235 Jefferson Davis Highway
Arlington, Virginia
- 22202 6. CS
Commercial Standard of NBS (US
Dept. of Commerce)
Government Printing Office
7. EPA
Environmental Protection Agency, Region II
26 Federal Plaza
New York, New York 10007
Asbestos Coordinator - Room 802
(212) 264-9538
Part 61, Sub-Parts A & B
National Emission Standard for Asbestos
8. FEDERAL SPECS
Federal Specification (General Services Administration)
7th and D Street, SW
Washington, District of Columbia 20406
9. NBS
National Bureau of Standards
(US Department of Commerce) Gaithersburg,
Maryland 20234
10. NEC
National Electrical Code (by NFPA)
11. NFPA
National Fire Protection Association
Batterymarch Park
Quincy, Massachusetts 02269
12. NIOSH
National Institute for Occupational Safety and Health
26 Federal Plaza
New York, New York 10007
13. NYSDOH
New York State Department of Health
Bureau of Toxic Substance Assessment
Room 359 - 3rd Floor
Tower Building Empire State Plaza

Albany, New York 12237

14. NYSDEC

New York State Department of Environmental Conservation
Room 136
50 Wolf Road
Albany, New York 12233-3245

15. NYSDOL

State of New York Department of Labor
Division of Safety and Health
Asbestos Control Program
State Campus
Building 12
Albany, New York 12240

16. OSHA

Occupational Safety and Health Administration (US
Department of Labor)
New York Regional Office - room 3445
1515 Broadway
New York, New York 10036

17. UL

Underwriters Laboratories
333 Pfingsten Road
Northbrook, Illinois 60062

B. Federal Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA):

- a. Asbestos Regulations
Title 29, Part 1910, 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 & Medical Records
Title 29, Part 1910, Section 20 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):

- a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Subpart E of the Code of Federal Regulations.
- b. Worker Protection Rule
40 CFR Part 763, Subpart G, CPTS 62044, FLR 2843-9
Federal Register, Vol. 50, No. 134, 7/12/85, P28530-28540

c. Regulation for Asbestos
Title 40, Part 61, Subpart A of the Code of Federal Regulations

d. National Emission Standard for Asbestos
Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations

e. Resource Conservation and Recovery Act (RCRA) 1976, 1980
Hazardous and Solid Waste Amendments (HSWA) 1984
Subtitle D, Subtitle C

3. U.S. Department of Transportation (DOT):

a. Hazardous Substances: Final Rule Regulation 49 CFR, Part 171 and 172.

C. State Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. New York State Department of Environmental Conservation (DEC) Regulations regarding waste collection registration. Title 6, Part 364 of the New York State Official Compilation of Codes, Rules and Regulations - 6NYCRR 364.
2. New York State Right-To-Know Law
3. New York State Department of Labor Asbestos Regulations Industrial Code Rule 56.
4. New York State Department of Health, Title 10 Part 73 Asbestos Safety Program Requirements.

D. Standards: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. American National Standards Institute (ANSI)
 - a. Fundamentals Governing the Design and Operation of Local Exhaust Systems
Publication Z9.2-79
 - b. Practices for Respiratory Protection
Publication Z88.2-80

E. Guidance Documents: Those that discuss asbestos abatement work or hauling, and disposal of asbestos waste materials are listed below only for the Abatement Contractor's information. These documents do not describe the work and are not a part of the work of this contract.

EPA:

1. Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book) EPA560/5-85-024.
2. Asbestos Waste Management Guidance EPA 530-SW-85-007.

F. Patents and Royalties: The Abatement Contractor shall pay all royalties and/or license fees. The Abatement Contractor shall defend all suits and claims for infringement of any patent rights and save the Owner and Consultant harmless from loss including attorney fees on account thereof.

1.06 DEFINITIONS

As used in or in connection with these specifications the following are terms and definitions.

Abatement - Procedure to control release from asbestos material. This includes removal, encapsulation and enclosure.

Aggressive sampling - A method of sampling in which the person collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

AIHA - The American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

Airlock - A system for permitting entrance and exit while restricting air movement between a containment area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

Air sampling - The process of measuring the content of a known volume of air collected during a specific period of time.

Amended water - Water to which a surfactant has been added.

Approved asbestos safety program - A program approved by the Commissioner of Health providing training in the various disciplines that may be involved in an asbestos project.

Area air sampling - Any form of air sampling or monitoring where the sampling device is placed at some stationary location.

Asbestos - Any naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cumingtonite-gunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

Asbestos contract - An oral or written agreement contained in one or more documents for the performance of work on an asbestos project and includes all labor, goods and service.

Asbestos handler - An individual who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material, or who disturbs friable asbestos. Only individuals certified by NYS Department of Labor shall be acceptable for work under this specification.

Asbestos handling certificate - A certificate issued by the Commissioner of Labor of the State of New York, to a person who has satisfactorily completed an approved asbestos safety program.

Asbestos project - Work undertaken by a contractor which involves the installation, removal, encapsulation, application or enclosure of any ACM or the disturbance of friable ACM.

Asbestos Safety Technician (AST) - Individual designated to represent the Consultant, perform third party monitoring and perform compliance monitoring at the job site during the asbestos project.

Asbestos waste material - Asbestos material or asbestos contaminated objects requiring disposal.

Authorized visitor - The building owner, his or her representative or any representative of a regulatory or other agency having jurisdiction over the project.

Background level monitoring - A method used to determine ambient airborne concentrations inside and outside of a building or structure prior to starting an abatement project.

Building owner - The person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

Clean room - An uncontaminated area or room that is a part of the personal decontamination enclosure with provisions for storage of persons' street clothes and protective equipment.

Cleanup - The utilization of HEPA vacuuming to control and eliminate accumulations of asbestos material and asbestos waste material.

Clearance air monitoring - The employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement project.

Commissioner - Commissioner of the New York State Department of Labor.

Contractor - A company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

Curtained doorway - A device that consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and the left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

Decontamination enclosure system - A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of persons, materials, equipment, and authorized visitors.

Encapsulant (sealant) or encapsulating agent - A liquid material that can be applied to asbestos material and which prevents the release of asbestos from the material by creating a membrane over the surface.

Enclosure - The construction of airtight walls, ceilings and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, or any other appropriate procedure that prevents the release of asbestos materials.

Equipment room - A contaminated area or room that is part of the personal decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

Fixed object - A unit of equipment, furniture or other fixture in the work area which cannot be readily removed from the work area.

Friable Asbestos Material - That condition of crumbled, pulverized, powdered, crushed or exposed asbestos capable of being released into the air by hand pressure.

Friable material containment - The encapsulation or enclosure of any friable asbestos material.

Glovebag technique - A method for removing asbestos material from heating, ventilating, and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other nonplanar surfaces in a noncontained work area. The glovebag assembly is a manufactured device consisting of a glovebag constructed of at least six mil transparent plastic, two inward-projecting longsleeve gloves, which may contain an inward projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and to contain all asbestos fibers released during the abatement process.

HEPA filter - A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particulate greater than 0.3 microns equivalent aerodynamic diameter.

HEPA vacuum equipment - Vacuuming equipment with a high efficiency particulate air filtration system.

Holding area - A chamber in the waste decontamination enclosure located between the washroom and an adjacent uncontaminated area.

Homogeneous work area - A site within the abatement work area that contains one type of asbestos material and where one type of abatement is used.

Large asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material.

Minor asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material.

Movable object - A unit of equipment, furniture or fixture in the work area that can be readily removed from the work area.

Negative air pressure equipment - A local exhaust system equipped with HEPA filtration. The system shall be capable of creating and maintaining a negative pressure differential between the outside and the inside of the work area.

Non-asbestos material - Any material containing one percent or less asbestos by weight.

Occupied area - Any frequented portion of the work site where abatement is not taking place.

Outside air - The air outside the building or structure.

Personal air monitoring - A method used to determine an individual's exposure to airborne contaminants. The sample is collected outside the respirator in the person's breathing zone.

Plasticize - To cover floors, walls, ceilings and other surfaces with 6 mil fire retardant plastic sheeting as herein specified.

Project - Any form of work performed in connection with the abatement of asbestos or alteration, renovation, modification or demolition of a building or structure that may disturb asbestos or asbestos material.

Removal - The stripping of any asbestos material.

Repair - Corrective action using required work practices to control fiber release from damaged areas.

Respiratory protection - Respiratory protection required of licensed asbestos workers and authorized visitors in accordance with the applicable laws.

Satisfactory clearance air monitoring results - For all post- abatement samples, airborne concentrations of total fibers that are less than 0.01 fibers per cubic centimeter or background levels, whichever are greater, using phase contrast microscopy (PCM).

Shower room - A room between the clean room and the equipment room in the personal decontamination enclosure with hot and cold running water controllable at the top and arranged for complete showering during decontamination.

Small asbestos project - An asbestos project involving the installation, removal, disturbances, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material of more than 25 and less than 260 linear feet of asbestos or asbestos material.

Staging area - The area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

Surfactant - A chemical wetting agent added to water to improve its penetration.

Visible emissions - An emission of particulate material that can be seen without the aid of instruments.

Washroom - A room between the work area and the holding area in the waste decontamination enclosure system, where equipment and waste containers are wet cleaned and/or HEPA vacuumed.

Waste decontamination enclosure system - An area, consisting of a washroom and a holding area, designated for the controlled transfer of materials and equipment.

Wet cleaning - The process of eliminating asbestos contamination from surfaces, equipment or other objects by using cloths, mops, or other cleaning tools.

Work area - Designated rooms, spaces, or areas where asbestos abatement takes place.

Work site - Premises where asbestos abatement is taking place.

Work Surface - Substrate surface from which asbestos-containing material has been removed.

1.07 UTILITIES, SERVICE AND TEMPORARY FACILITIES

- A. The Owner shall make available to the Abatement Contractor all reasonable amounts of water and electrical power at no charge.
- B. The Abatement Contractor shall provide, at his own expense, all electrical, water, and waste connections, extensions, and construction materials, supplies, etc. All connections must be approved in advance by the Owner and all work relative to the utilities must be in accordance with the applicable building codes.
- C. The Abatement Contractor shall provide scaffolding, ladders and staging, etc. as necessary to accomplish the work of this contract. The type, erection and use of all scaffolding, ladders and staging, etc. shall comply with all applicable OSHA provisions.
- D. All connections to the Owner's water system shall include reduced pressure backflow protection or double check and double gate valves. 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 be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
- E. The Abatement Contractor shall use only heavy-duty abrasion resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each decontamination unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. All water must be shut off at the end of each shift.
- F. The Abatement Contractor shall provide service to decontamination unit electrical subpanel with minimum 60-amp, 2 pole circuit breaker or fused disconnect and ground-fault circuit interrupters (GFCI), reset button and pilot light, connected to the building's main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. This electrical subpanel shall be used for hot water heater, PAPR battery recharging and air sampling pumps.
- G. The Abatement Contractor shall provide UL rated 40-gallon electric hot water heater to supply hot water for the decontamination unit shower. Activate from 30-amp circuit breaker on the electrical subpanel located within the decontamination unit. Provide with relief valve compatible with water heater operation, relief valve down to drip pan on floor with type L copper. Wiring of the hot water heater shall follow NEMA, NEC, and UL standards.
- H. The Abatement Contractor shall provide identification warning signs at power outlets, which are other than 110-120-volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 plugs into higher voltage outlets. Dry transformers shall be provided where required to provide voltages necessary for work operations. All outlets or power supplies shall be protected by ground fault circuit interrupter (GFCI) at the power source.
- I. The Abatement Contractor shall use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.
- J. The Abatement Contractor shall provide general service incandescent lamps of wattage indicated or required for adequate illumination; Protect lamps with guard cages or tempered glass enclosures; Provide exterior fixtures where fixtures are exposed to moisture.
- K. The Abatement Contractor shall provide temporary heat or air conditioning as necessary to maintain comfortable working temperatures inside and immediately outside the work areas. Heating and A/C equipment shall have been tested and labeled by UL, FM or another recognized trade association related to the fuel being used. Fuel burning heaters shall not be used inside containment areas. The Contractor shall also provide a comfortable working environment for occupied areas that are impacted by the asbestos removal.
- L. The Abatement Contractor shall comply with recommendations of the NFPA standard in regard to the use and application of fire extinguishers. Locate fire extinguishers where they are most convenient and effective for their intended purpose but provide not less than one extinguisher in each work area, equipment room, clean room and outside the work area.

1.08 REMOVAL OF FIXTURES

- A. In locations where the Abatement Contractor is directed to dispose of fixtures, he shall either decontaminate the fixtures and dispose of them as non-asbestos containing materials, or he shall place them in an appropriate container and dispose of them as asbestos containing material.
- B. In locations where the Abatement Contractor is directed to remove and reinstall fixtures, the fixtures shall be removed, decontaminated, labeled, protected with plastic and stored by the contractor in a location as directed by the Owner.
- C. Upon completion of the asbestos removal and upon receiving satisfactory clearance air monitoring results, all items to be replaced shall be restored to their original location and reinstalled by the Abatement Contractor.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. GENERAL REQUIREMENTS

- 1. Materials shall be stored off the ground, away from wet or damp surfaces and under protective cover to prevent damage or contamination.
- 2. Damaged or deteriorating materials shall not be used and shall be removed from the premises.
- 3. Power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.
- 4. The Abatement Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work surfaces can be easily and safely reached for inspection. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos. Scaffolds and ladders shall comply with all applicable codes.

B. PLASTIC BARRIERS (POLYETHYLENE)

- 1. In sizes and shapes to minimize the number of joints.
 - a. Six mil. (.006") fire-retardant for vertical protection (walls, entrances and openings).
 - b. Six mil. (.006") fire-retardant for horizontal protection (fixed equipment) and heating grilles.
 - c. Six mil. (.006") reinforced fire-retardant for floors of decon units.
- 2. Provide two (2) layers over all roof, wall and ceiling openings. Floor penetrations shall be sealed with a rigid material prior to plasticizing to prevent tripping and fall hazards. All seams within a layer shall be separated by a minimum distance of six feet and sealed airtight. All seams between layers shall be staggered.
- 3. Barrier Attachment - Commercially available duct tape (fabric or paper) and spray-on adhesive. Duct tape shall be capable of sealing joints of adjacent sheets of plastic, facilitating attachment of plastic sheets to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions.

C. SIGNS

- 1. Danger signs shall be provided and shall conform to 29 CFR 1926.1101 and be 14" x 20". These signs shall bear the following information:

**DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE
CLOTHING
ARE REQUIRED IN THIS AREA**

D. DANGER LABELS AND TAPE

1. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain the following information:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID BREATHING DUST
CANCER AND LUNG DISEASE HAZARD**

2. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall contain the following information:

**RQ HAZARDOUS SUBSTANCE
SOLID, NOS, ORM-E, NA 9188
(ASBESTOS)**

3. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 40 CFR Part 61.150, NESHAP; Asbestos; Final Rule (USEPA) and shall contain the name of the waste generator and the location at which the waste was generated.

NOTE: All containers marked as above (1,2 and 3) shall be disposed of as asbestos waste.

4. Provide 3" red barrier tape printed with black lettered "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos work area.

E. PROTECTIVE EQUIPMENT

1. Respiratory Requirements

- a. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators are the minimum allowable respiratory protection permitted to be utilized during removal operations.
- b. Where not in violation of NIOSH, OSHA, and any other regulatory requirements, the Abatement Contractor shall provide the following minimum respiratory protection to the maximum use concentrations indicated:

<u>MSHA/NIOSH Approved Respiratory Protection</u>	<u>Maximum Use Concentration</u>
Half-Mask Air Purifying with HEPA Filters	10x PEL
Full-Facepiece Air Purifying HEPA Filters and Quantitative Fit Test	10x PEL
Powered Air Purifying (PAPR), Loose fitting Helmet or Hood, HEPA Filter	25x PEL
Powered Air Purifying (PAPR), Full Facepiece, HEPA Filter	50x PEL
Supplied Air, Continuous Flow Loose fitting Helmet or Hood	25x PEL

Supplied Air, Continuous Flow Full Facepiece, HEPA Filter	50x PEL
Full Facepiece-Supplied Air Pressure Demand, HEPA Filter	100x PEL
Full Facepiece-Supplied Air Pressure Demand, with Aux. SCBA, Pressure Demand or Continuous Flow	>100x PEL

2. Disposable Clothing - "Tyvek" manufactured by Dupont or approved equal.
3. NIOSH approved safety goggles to protect eyes.
4. Polyethylene bags, 6 mil. (.006") thick (use double bags).

NOTE: Workers must always wear disposable coveralls and respirator masks while in the work area. Contaminated coveralls or equipment must be left in work area and not worn into other parts of the building.

F. TOOLS AND EQUIPMENT

1. Airless Sprayer - An airless sprayer, suitable for application of encapsulating material, shall be used.
2. Scaffolding - Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.
3. Transportation Equipment - Transportation equipment, as required, shall be suitable for loading, temporary storage, transport and unloading of contaminated waste without exposure to persons or property. Watertight, hard wall containers shall be provided to retain and dispose of any asbestos waste material with sharp-edged components that may tear plastic bags or sheeting. The containers shall be marked with danger labels.
4. Surfactant - Wetting Agents - "Asbestos-Wet" - Aquatrols Corp. of America or approved equal and shall be non-carcinogenic.
5. Portable (negative air pressure) asbestos filtration system - by Micro-Trap or approved equal.
6. Vacuum, HEPA type equal to "Nilfisk" #GA73, or "Pullman/Holt" #75 ASA.
7. Amended Water Sprayer - The water sprayer shall be an airless or other low-pressure sprayer for amended water application.
8. Other Tools and Equipment - The Abatement Contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, nylon brushes, sponges, rounded edge shovels, brooms, and carts.

PART 3 – EXECUTION

3.01 PRE-ABATEMENT WORK AREA PREPARATION

- A. The work area shall be vacated by the occupants prior to work area preparation and not reoccupied until satisfactory clearance air monitoring results have been achieved.
- B. Caution signs shall be posted at all locations and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted that permit a person to read the sign and take the necessary protective measures to avoid exposure.
- C. Shut down and lock out electric power to all work areas. The Abatement Contractor shall provide temporary power and lighting and ensure safe installation of temporary power sources and equipment used where high humidity and/or water

shall be sprayed in accordance with all applicable codes. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.

- D. Isolate the work area HVAC system.
- E. The personnel decontamination enclosure system shall be installed or constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material. The waste decontamination enclosure system shall be installed or constructed prior to commencement of abatement activities.
- F. Movable objects within the work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning and such objects shall be removed from the work area to an uncontaminated location. If disposed of as asbestos waste material, cleaning is not required.
- G. Fixed objects and other items, which are to remain within the work area, shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Such objects shall be enclosed with two layers of at least six mil plastic sheeting and sealed with tape.
- H. The work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited. Asbestos material shall not be disturbed during pre-cleaning.
- I. Isolation barriers that seal off all openings, including windows, corridors, doorways, ducts, and any other penetrations of the work area, shall be constructed using two layers of at least six mil fire-retardant plastic sheeting sealed with tape. Also, all seams in mechanical system components that pass through the work area shall be sealed. Doorways and corridors, which shall not be used for passage during work, shall also be sealed.
- J. Removal of mounted objects. After isolation barriers are in place, objects such as light fixtures, electrical track, alarm systems, ventilation equipment and other items not previously sealed, shall be double sealed with six mil fire-retardant plastic sheeting. Localized HEPA filtered vacuum equipment shall be used during fixture removal to reduce asbestos dispersal.
- K. Individual roof and floor drains shall be sealed watertight using two layers of 6-mil fire-retardant plastic sheeting and tape prior to plasticizing. Openings in floor shall be fully covered with plywood sheeting secured to the floor in such a way as to minimize a tripping hazard prior to plasticizing.
- L. Emergency and fire exits from the work area shall be maintained or alternate exits shall be established according to all applicable codes.
- M. Adequate toilet facilities shall be supplied by the Abatement Contractor and shall be located either in the clean area of the personnel decontamination enclosure or shall be readily accessible to the personnel decontamination enclosure.

3.02 LARGE ASBESTOS PROJECT PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

- A. The personnel decontamination enclosure shall be constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material.
 - 1. Construction and use of personnel decontamination enclosure systems shall be in accordance with ICR-56 and any Applicable or Site-Specific Variances utilized on this project. Such systems may consist of existing rooms outside of the work area, if the layout is appropriate, that can be enclosed is plastic sheeting and are accessible from the work area. When this situation does not exist, enclosure systems may be constructed out of metal, wood or plastic support.
 - 2. The personnel decontamination enclosure system shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by three airlocks.
 - 3. There shall be one shower per six full shift abatement persons calculated on the basis of the largest shift.
 - 4. The personnel decontamination enclosure system shall be fully framed, sheathed for safety and constructed to prevent unauthorized entry.

5. Personnel decontamination enclosure systems constructed at the work site shall utilize at least six mil fire-retardant opaque plastic sheeting. At least two layers of six mil fire-retardant reinforced plastic sheeting shall be used for the flooring of this area.
6. All prefabricated decontamination units shall be completely decontaminated and sealed prior to separation and removal from the work area. Mobile decontamination units shall remain in place until satisfactory clearance results have been attained.
7. The clean room shall be sized to accommodate all authorized persons. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall also be provided. Clean clothing, replacement filters for respirators, towels and other necessary items shall be provided. The clean room shall not be used for the storage of tools, equipment or materials. It shall not be used for office space. A lockable door shall be provided to permit access to the clean room from outside the work area or enclosure. It shall be used to secure the work area and decontamination enclosure during off-shift hours.
8. The shower room shall contain one or more showers. Each shower head shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be available at all times. Shower water shall be drained, collected and filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste. The shower room shall be constructed in such way that travel through the decontamination unit shall be through the shower.
9. The equipment room shall be used for the storage of equipment and tools after decontamination using a HEPA filtered vacuum and/or wet cleaning. A one day supply of replacement filters, in sealed containers, for HEPA vacuums and negative pressure ventilation equipment, extra tools, containers of surfactant and other materials and equipment that may be required during the abatement project may also be stored here. A walk-off pan filled with water shall be located in the work area just outside the equipment room for persons to clean foot covering when leaving the work area. A drum lined with a labeled, at least six mil plastic bag is required for collection of clothing and shall be located in this room. Contaminated footwear and work clothes shall be stored in this area.

3.03 WASTE DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. General Requirements

1. A waste decontamination enclosure system shall consist of the following:
 - a. A washroom/cleanup room shall be constructed with an airlock doorway to the work area and another airlock doorway to the holding area.
 - b. The holding area shall be constructed with an airlock doorway to the washroom/cleanup room and another lockable door to the outside.
2. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the equipment decontamination room, which doubles as a waste washroom, of the personnel decontamination enclosure.
3. The waste washroom shall be equipped with a drain installed to collect water and deliver it to the shower drain where it shall be filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.
4. The waste washroom shall be constructed in such a way that travel through the rooms shall be through the waste washroom

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

- A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved:
1. All persons shall enter and exit the work area through the personnel decontamination enclosure system.
 2. All persons who enter the work area or an enclosure shall sign the entry/exit log, located in the clean room, upon every entry and exit.
 3. All persons, before entering the work area, or an enclosure shall read and be familiar with all posted regulations, personal protection requirements, including work area entry and exit procedures, and emergency procedures. The entry/exit log headings shall indicate, and the signatures shall be used to acknowledge, that these have been reviewed and understood by all persons prior to entry.
 4. All persons shall proceed first to the clean room, remove all street clothing, store these items in clean sealable plastic bags or lockers and don coveralls, head covering, foot covering and gloves. All persons shall also don NIOSH approved respiratory protection. Clean respirators and protective clothing shall be utilized, by each person, for each separate entry into the work area. Respirators shall be inspected prior to each use and tested for proper seal using quantitative or qualitative fit checks.
 5. Persons wearing designated personal protective equipment shall proceed from the clean room through the shower room to the equipment room, where necessary tools are collected and any additional clothing shall be donned, before entry into the work area.
 6. Before leaving the work area, all persons shall remove gross contamination from the outside of respirators and protective clothing by brushing, wet cleaning, and/or HEPA vacuuming.
 7. Persons shall proceed to the equipment room where all coveralls, head covering, foot covering and gloves shall be removed. Disposable clothing shall be deposited into labeled containers for disposal. Reusable contaminated clothing, footwear, head gear and gloves shall be stored in the equipment room when not being used in the work area.
 8. Still wearing respirators, persons shall proceed to the shower area, clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then fully and vigorously shower and shampoo to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Some types of respirators will require slight modification of these procedures. An airline respirator with HEPA filtered disconnect protection shall be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece shall be disconnected from the filter/power pack assembly prior to entering the shower.
 9. After showering and drying, all persons shall proceed to the clean room and don clean personal protective equipment if returning to the work area or street clothing if exiting the enclosure.

3.05 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION & REMOVAL PROCEDURES

- A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved.
1. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. These work area persons shall not enter the airlock.
 2. These contaminated items shall be removed from the airlock by persons stationed in the washroom during waste removal operations. These washroom persons shall remove gross contamination from the exterior of their respirators and protective clothing by brushing, HEPA vacuuming and/or wet cleaning.
 3. Once in the waste decontamination enclosure system, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.
 4. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting and sealed airtight.

5. The clean recontainerized items shall be moved into the airlock that leads to the holding area. The washroom persons shall not enter this airlock or the work area until waste removal is finished for that period.
6. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.
7. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
8. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
9. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.
10. Containers labeled with Asbestos hazard warnings shall not be used to dispose of non asbestos waste.

3.06 ENGINEERING CONTROLS

A. Ventilation.

1. The Abatement Contractor shall employ HEPA equipped vacuums or negative air pressure equipment for ventilation as required.
2. All negative air pressure equipment ventilation units shall be equipped with HEPA filtration. The Contractor shall provide a manufacturer's test certificate for each unit documenting the capability of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns equivalent aerodynamic diameter.
3. A power supply shall be available to satisfy the requirements of the total of all ventilating units.
4. On electric power failure, abatement shall stop immediately and shall not resume until power is restored and exhaust units are operating fully. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all persons from the work area, shall be sealed airtight.
5. If extending the exhaust of the ventilation units 50 feet from the building would result in an exhaust location either in the road, blocking driveway access to the facility or within 50 feet of other buildings, a second unit will be run in series with the primary unit.

3.07 MAINTENANCE OF DECONTAMINATION ENCLOSURE SYSTEMS AND WORK AREA BARRIERS

A. GENERAL REQUIREMENTS

1. The Consultant must review and approve installation before commencement of work. Upon completion of the construction of all plastic barriers and decontamination system enclosures and prior to beginning actual abatement activities.
2. All plastic barriers inside the work area, in the personnel decontamination enclosure system, in the waste decontamination enclosure system and at partitions constructed to isolate the work area from occupied areas, shall be inspected by the asbestos supervisor at least twice daily. The barriers shall be inspected before the start of and following the completion of the day's abatement activities. Inspections and observations shall be documented in the project log.
3. Damage and defects in the barriers and/or enclosure systems shall be repaired immediately upon discovery and prior to resumption of abatement activities.
4. At any time during the abatement activities, if visible emissions are observed outside of the work area or if damage occurs to the barriers, work shall be stopped, repairs made and visible residue immediately cleaned up using HEPA vacuuming methods prior to the resumption of abatement activities.

5. The Abatement Contractor shall HEPA vacuum and/or wet clean the waste decontamination enclosure system and the personnel decontamination enclosure system at the end of each day of abatement activities.

3.08 HANDLING AND REMOVAL PROCEDURES

The Abatement Contractor may utilize existing provisions of ICR-56, Applicable Variances or a Site-Specific Variance, approved by the Owner's Consultant, to permit the conduct of this work.

3.09 ABATEMENT PROCEDURES

A. AIR SAMPLING - By Owner

1. Air sampling and analysis shall be conducted according to the requirements of Subpart 56-4 before the start, during and after the completion of the asbestos removal project.
 2. In addition to the requirements of Subpart 56-4, air monitoring shall be conducted in accordance with any approved job specific variance(s) or applicable variance utilized.
 3. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.
 4. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR 763.90[i].
- B. The provisions of the Applicable Variances or a Job Specific Variance shall apply only in those areas where approval has been granted by the NYS DOL and the Contractor has obtained concurrence from the Owner's Consultant. All other applicable provisions of Industrial Code Rule 56-1 through 56-12 shall be complied.
- C. A copy of the NYS DOL Job Specific or Applicable Variance, if applicable, shall be conspicuously posted at the work area(s).
- D. The Abatement Contractor shall construct a decontamination unit at the work site. The Abatement Contractor shall, as a minimum, comply with the requirements of 29 CFR 1926.1101(j); Hygiene facilities and practices for employees.

3.10 ENCAPSULATION PROCEDURES

The following procedures shall be followed to seal in non-visible residue, after obtaining satisfactory clearance air monitoring results, while conducting lockdown encapsulation on any surfaces which were the subject of removal or other remediation activities:

- A. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA contract shall be used for lockdown encapsulation.
- B. Sealants considered for use in encapsulation shall first be tested to ensure that the sealant is adequate for its intended use. A section of the work surface shall be evaluated following this initial test application of the sealant to quantitatively determine the sealant's effectiveness in terms of penetrating and locking down the asbestos fibers. The American Society of Testing and Materials (ASTM) Committee E06.21.06E on Encapsulation of Building Materials has developed a guidance document to assist in the selection of an encapsulant.
- C. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.
- D. Encapsulants shall be applied using airless spray equipment.
 1. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.
- E. Encapsulation shall be utilized as a surface sealant once all asbestos containing materials have been removed in a work area. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring.

3.11 CLEANUP PROCEDURES

A. The following cleanup procedures shall be required.

1. Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos materials have been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.
2. Accumulations of dust shall be cleaned off all surfaces on a daily basis using HEPA vacuum cleaning methods.
3. Decontamination enclosures shall be HEPA vacuumed at the end of each shift.
4. Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.
5. Excessive water accumulation or flooding in the area shall require work to stop until the water is collected and disposed of properly.

B. The following cleanup procedures shall be required after completion of all removal activities.

1. All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pan, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.
2. Cleaning. All surfaces in the work area shall be HEPA vacuumed. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.
3. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.
4. All containerized waste shall be removed from the work area and the holding area.
5. All tools and equipment shall be decontaminated and removed from the work area.
6. A final visual inspection and clearance air monitoring, as per the schedule for air sampling and analysis, shall be conducted.
7. The isolation barriers and decontamination unit shall be removed only after satisfactory clearance air monitoring results have been achieved.

3.12 SAFETY MONITORING – CONSULTANT:

The Consultant will designate an Asbestos Safety Technician (AST) to represent the Owner during the removal program. The AST must be on the job site at all times during abatement work. Absolutely no abatement or preparation work will occur without the presence of the AST.

The AST will conduct four (4) milestone inspections.

1. Pre-commencement inspection shall be conducted as follows:
 - a. Notification in writing to the Consultant shall be made by the Abatement Contractor to request a pre-commencement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested prior to beginning preparatory work in another work area.
 - b. The AST shall ensure that:
 - i. The job site is properly prepared and that all containment measures are in place;

- ii. The designated supervisor shall present to the inspector a valid supervisor's license issued by the New York Department of Labor;
 - iii. All workers shall present to the inspector a valid handler's license issued by the New York Department of Labor;
 - iv. Measures for the disposal of removed asbestos material are in place and shall conform to the adopted standards;
 - v. The Abatement Contractor has a list of emergency telephone numbers at the job site which shall include the monitoring firm employed by the Owner and telephone numbers for fire, police, emergency squad, local hospital and health officer.
- c. If all is in order, the AST shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any work is to commence. Conditional approvals shall not be granted.

Progress inspection shall be conducted as follows:

- a. Primary responsibility for ensuring that the abatement work progresses in accordance with these technical specifications and regulatory requirements rests with the Abatement Contractor. The AST shall continuously be present to observe the progress of work and perform required tests.
- b. If the AST observes irregularities at any time, he shall direct such corrective action as may be necessary. If the Abatement Contractor fails to take the corrective action required, or if the Abatement Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, then the AST shall inform the Owner who shall issue a Stop Work Order to the Abatement Contractor and have the work site secured until all violations are abated.

Clean-up inspections shall be conducted as follows:

- a. Notice for clean-up inspection shall be requested by the Abatement Contractor at least 24 hours in advance of the desired date of inspection;
 - b. The clean-up inspection shall be conducted prior to the removal of any isolation or critical barriers and before final air clearance monitoring;
 - c. The AST shall ensure that:
 - i. The work site has been properly cleaned and is free of visible asbestos containing material and debris.
 - ii. All removed asbestos has been properly placed in a locked secure container outside of the work area.
 - d. If all is in order, the AST shall issue a written notice of authorization to remove surface barriers from the work area. All isolation barriers shall remain in place until satisfactory clearance air sampling has been completed.
4. Clearance Visual Inspection shall be conducted after the removal of non-critical plastic sheeting. The AST shall insure that:
- a. The work area is free of all visible asbestos or suspect asbestos debris and residue.
 - b. All waste has been properly bagged and removed from the work area.
 - c. Should clearance visual inspection identify residual debris, as determined by the AST, the Abatement Contractor is responsible for recleaning the area at his own cost and shall bear all costs of reinspection until acceptable levels are achieved.

B. The Abatement Contractor shall be required to receive written approval before proceeding after each milestone inspection.

3.13 PERSONNEL AIR MONITORING – CONTRACTOR (29 CFR 1926.1101)

- A. Personnel air monitoring shall be provided to determine both short-term (STEL) and full shift during when abatement activities occur. Personnel sampling shall be performed in each work area in order to accurately determine the concentrations of airborne asbestos to which workers may be exposed.
- B. The Abatement Contractor shall have a qualified "Competent Person" (as specified in 29 CFR 1926 OSHA) to conduct personnel air monitoring.
- C. The laboratory performing the air sample analysis shall be certified by NYS DOH ELAP and approved by the consultant.
- D. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

3.14 CLEARANCE AIR MONITORING

- A. Air samples will be collected in and around the work areas at the completion of abatement activities.
- B. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.
- C. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR part 763 "Asbestos-Containing Materials in Schools; Final Rule and Notice" section 763.90.
- D. ***RETESTING***
Should clearance air monitoring yield fiber concentrations above the "Clearance" criteria of either 0.01 fibers per CC and/or background levels (PCM) –OR- seventy (70) structures per square millimeter (TEM/AHERA), the Abatement Contractor is responsible for re-cleaning the area at his own cost and shall bear all costs associated with the retesting of the work area(s) including monitoring labor, sampling, analysis, etc. until such levels are achieved.

3.15 RESPIRATORY PROTECTION REQUIREMENT

- A. Respiratory protection shall be worn by all individuals inside the work area from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with these specifications. The Abatement Contractor shall keep available at all times two PAPR's with new filters and charged batteries for use by authorized visitors.
- B. All respiratory protection shall be MSHA/NIOSH approved in accordance with the provisions of 30 CFR Part II. All respiratory protection shall be provided by the Abatement Contractor and used by workers in conjunction with the written respiratory protection program.
- C. The Abatement Contractor shall provide respirators that meet the requirements of 29 CFR Parts 1910 and 1926.
 - 1. Full facepiece Type C supplied-air respirators operated in pressure demand mode equipped with an auxiliary self-contained breathing apparatus, operated in pressure demand or continuous flow, shall be worn during gross removal, demolition, renovation and/or other disturbance of ACM whenever airborne fiber concentrations inside the work area are greater than 10.0 f/cc.
 - 2. Full facepiece Type C supplied-air respirators operated in pressure demand mode with HEPA filter disconnect protection shall be work during gross removal, demolition, renovation and/or other disturbance of ACM with an amphibole content and/or whenever airborne fiber concentrations inside the work area are equal to or greater than 0.5 f/cc and less than or equal to 10.0 f/cc.
 - 3. Full facepiece powered air-purifying respirators (PAPR) equipped with HEPA filters shall be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.5 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow, with HEPA filter disconnect protection, may be substituted for a powered air-purifying respirator.
 - 4. Loose fitting helmets or hoods with powered air-purifying respirators (PAPR) equipped with HEPA filters may be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber

concentrations inside the work area are less than 0.25 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow may be substituted for a powered air-purifying respirator.

5. Half-mask or full-face air-purifying respirators with HEPA filters shall be worn only during the preparation of the work area and final clean up procedures provided airborne fiber concentrations inside the work area are less than 0.1 f/cc.
6. Use of single use dust respirators is prohibited for the above respiratory protection.
- D. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.
- E. The Abatement Contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every six months thereafter with the type of respirator he/she will be using.
- F. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.
- G. No facial hair, which interferes with the face-to-mask sealing surface, shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.
- H. Contact lenses shall not be worn in conjunction with respiratory protection.
- I. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the Abatement Contractor at the Abatement Contractor's expense.
- J. Respiratory protection maintenance and decontamination procedures shall meet the following requirement:
 1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134(b); and
 2. HEPA filters for negative pressure respirators shall be changed after each shower; and
 3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures; and
 4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator facepieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations; and
 5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted; and
 6. Organic solvents shall not be used for washing respirators.
- K. No visitors shall be allowed to enter the contaminated area if they do not have their medical certification and training certificate. Authorized visitors shall be provided with suitable PAPR respirators and instructions on the proper use of respirators whenever entering the work area.

3.16 DISPOSAL OF WASTE

A. APPLICABLE REGULATIONS

1. All asbestos waste shall be stored, transported and disposed of as per, but not limited to, the following Regulations:
 - a. NYS Code Rule 56
 - b. U.S. Department of Transportation (DOT)

Hazardous Substances

Title 29, Part 171 and 172 of the code of Federal Regulations regarding waste collector registration

- c. Regulations regarding waste collector registration Title 6, part 364 of the New York State Official Compilation of Codes, Rules and Regulations – 6 NYCRR 364
 - d. USEPA NESHAPS 40 CRF 61
 - e. USEPA ASBESTOS WASTE MANAGEMENT GUIDANCE EPA/530-SW-85-007
- B. TRANSPORTER OR HAULER - The Abatement Contractor shall bear full responsibility for proper characterization, transportation and disposal of all solid or liquid waste, generated during the project, in a legal manner. The Owner shall approve all transportation and disposal methods.
1. The Abatement Contractor's Transporter (hauler) and disposal site shall be approved by the Owner. The Abatement Contractor shall remove within 48 hours all asbestos waste from the site after completing the clean up.
 2. The Transporter must possess and present to the Owner's representative a valid New York State Department of Environmental Conservation Part 364 asbestos hauler's permit to verify license plate and permit numbers. The Owner's representative will verify the authenticity of the hauler's permit with the proper authority.
 3. The Abatement Contractor shall give 24 hour notification prior to removing any waste from the site. All waste shall be removed from site only during normal working hours. No waste may be taken from the site without authorization from the Owner's representative.
 4. The Abatement Contractor shall have the Transporter give the date and time of arrival at the disposal site.
 5. The Transporter with the Abatement Contractor and Owner's consultant shall inspect all material in the transport container prior to taking possession and signing the Waste Manifest. The Transporter shall not have any off site transfers or be combined with any other off-site asbestos material.
 6. The Transporter must travel directly to the disposal site with no unauthorized stops.

C. WASTE STORAGE CONTAINER

1. During loading and on site storage, the asbestos waste container shall be labeled with EPA Danger signage:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

2. The NYS DEC Hauler's Permit number shall be on both sides and back of the container.
3. The Container will not be permitted to leave the site without the proper signage.
4. A copy of the completed waste manifest shall be forwarded directly to the Owner's Consultant by the disposal facility.
5. Packaging of Non-friable Asbestos. Use of an open top container shall require written request, by the Contractor, and written approval by the Owners Representative, and be performed in compliance with all applicable regulations.
 - a) A chute, if used, shall be air/dust tight along its lateral perimeter and at the terminal connection to the dumpster at ground level (solid wall and top container). The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.
 - b) The container shall be lined with a minimum of two (2) layers of 6 mil. Fire-retardant polyethylene draped loosely over the sides so as to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

- c) Prior to transport from the work site the Dumpster will be disconnected from the chute and sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.
- 6. Packaging Friable Asbestos.
 - a) The container shall be a solid wall, hard top and lockable container.
 - b) The container shall be locked upon arrival at the site to restrict access. Security shall be provided at the entrance to the container during the loading process and immediately locked upon completion.
 - c) The interior walls, floor and ceiling shall be lined with two (2) layers of 6 mil. Fire-retardant polyethylene.
 - d) The waste shall be loaded in such a manner as to protect the integrity of the individual waste packages.
 - e) Prior to transport from the work site the interior of the Dumpster will sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

D. WASTE DISPOSAL MANIFEST

- 1. The Asbestos Waste Manifest shall be equivalent to the "Waste Shipment Record" included in 40 CFR 61. A copy of the Contractor's manifest shall be reviewed by the Owner's Consultant and shall be the only manifest used.
- 2. The Manifest shall be verified by the Owner's Consultant indicating that all the information and amounts are accurate and the proper signatures are in place.
- 3. The Manifest shall have the signatures of the Abatement Contractor and the Transporter prior to any waste being removed from the site.
- 4. The Manifest shall be signed by the Disposal Facility owner or operator to certify receipt of asbestos containing materials covered by the manifest.
- 5. A copy of the completed manifest shall be provided by the Abatement Contractor to the Owner's Consultant and remain on site for inspection.
- 6. Abatement Contractor shall maintain a waste disposal log which indicates load number, date and time left site, container size, type of waste, quantity of waste, name of hauler, NYS DES permit number, trailer and tractor license number, and date manifest was returned to Consultant.
- 7. The Disposal Facility owner or operator shall return a signed copy of the Waste Manifest directly to:

**North Rockland CSD
65 Chapel Street
Garnerville, New York 10923 ATTN:
Michael Senno**

- 8. Copies of the completed Waste Manifest are to be sent by the disposal facility to the Hauler and Abatement Contractor.
- 9. Submit signed dump tickets and manifests with final payment request.
- 10. Final payment request will not be honored without signed dump ticket or manifests accounting for all asbestos waste removed from the site.

E. VIOLATIONS OF SPECIFICATIONS

1. Violations of the safety, hygiene, environmental, procedures herein, any applicable federal, state or local requirements or failure to cooperate with the Owner's representative shall be grounds for dismissal and/or termination of this contract.

F. VIOLATIONS OF NO SMOKING POLICY

1. The Federal Pro Children Act of 1994 prohibits School District Officials from smoking in any buildings or on the grounds that is property of the School District. The District shall be considered smoke free. The School District strongly enforces its' No Smoking Policy. It is the Contractor's responsibility to inform all workers of this policy. Any worker(s) involved with this project that are found smoking or using tobacco products will be informed that they are in violation of the Federal and State Law and School Board Policy and will be removed from site.

3.17 LOCATION OF "ABATEMENT WORK"

(Please see attached Drawings for approximate locations)

1) NORTH ROCKLAND HIGH SCHOOL (INTERIOR ABATEMENT)

- Abatement Contractor responsible for total and complete removal and disposal of approximately 250 SF of presumed friable asbestos-containing Boiler Interiors (1 Boiler), as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown: □ Main Electric & Boiler Room, Boiler #3 (250 SF)
- Abatement Contractor responsible for total and complete removal and disposal of approximately 275 SF of friable asbestos-containing Boiler Exhaust Breeching, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
 - Main Electric & Boiler Room, Boiler #3 Exhaust Breeching (250 SF)
- Abatement Contractor responsible for total and complete removal and disposal of approximately 300 SF of friable asbestos-containing Water Storage Tank Insulation, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
 - Main Electric & Boiler Room, Water Storage Tank Insulation (300 SF)
- Abatement Contractor responsible for total and complete removal and disposal of approximately 20 LF of friable asbestos-containing Standby Generator Exhaust Insulation, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
 - Main Electric & Boiler Room, Standby Generator Exhaust Insulation (20 LF)
- Abatement Contractor responsible for total and complete removal and disposal of approximately 100 elbows of friable asbestos-containing Mudded Joint Packing (MJP's) of various sizes, on non-ACM fiberglass pipe runs, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
 - Main Electric & Boiler Room (100 elbows)

Note: Abatement contractor responsible for removal of all MJP's within the Main Electric & Boiler Room, regardless of whether they are shown on the ACM location drawings or not.

- Abatement Contractor responsible for total and complete removal and disposal of approximately 20 SF of nonfriable asbestos-containing Chiller Gaskets (2 Chillers), as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
 - Main Boiler Room, Chiller #1 (10 SF)
 - Main Boiler Room, Chiller #2 (10 SF)

END OF LOCATION OF WORK

3.18 GENERAL

- A. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to: ceiling tiles, ceiling finishes, wall finishes, floor finishes, etc.
- B. The Abatement Contractor shall be responsible for all demolition required to access materials identified in scope of work and on associated drawings.
- C. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. Additional asbestos abatement performed prior to the order to proceed will not be acknowledged.
- D. The Abatement Contractor shall remove asbestos-containing floor covering to the building substrate beneath; in areas indicted. Subsequent to final air clearance the substrate shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.
- E. Power tools used to drill, cut into or otherwise disturb asbestos containing material shall be equipped with HEPA filtered local exhaust ventilation.
- F. The Abatement Contractor shall provide access to GFCI electrical power, required to perform the area air monitoring for this project, within and immediately adjacent to each work area.
- G. Unwrapped or unbagged ACM shall be immediately placed in an impermeable waste bag or wrapped in plastic sheeting.
- H. Coordinate all removal operations with the Owner.

**Asbestos Employee Medical Examination Statement
Certificate of Worker Release
Asbestos Employee Training Statement
CERTIFICATE OF WORKERS'S ACKNOWLEDGEMENT**

PROJECT NAME: **North Rockland CSD: HS Chiller Replacement & HVAC Upgrades**

CONTRACTOR'S NAME: _____

WORKING WITH ASBESTOS INVOLVES POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER AND RESPIRATORY DISEASES. SMOKING CIGARETTES AND INHALATION OF ASBESTOS FIBERS INCREASES THE RISK THAT YOU WILL DEVELOP LUNG CANCER ABOVE THAT OF THE NON-SMOKING PUBLIC.

The Contract for this project requires your employer to 1) supply proper respiratory protection devices and training on their use 2) provide training on safe work practices and on use of the equipment used on the project 3) provide a medical examination meeting the requirements of 29 CFR 1926.1101. Your signature on this certificate, documents that your employer has fulfilled these contractual obligations and you understand the information presented to you.

*******DO NOT SIGN THIS FORM UNLESS YOU FULLY UNDERSTAND THIS INFORMATION*******

RESPIRATORY PROTECTION: I have been trained in the proper use and limitations of the type of respiratory protection devices to be used on this project. I have reviewed the written respiratory protection program manual and a copy is available for my use. Respiratory protection equipment has been provided, by the Contractor, at no cost to me.

TRAINING COURSE: I have been trained in the risks and dangers associated with handling asbestos, breathing asbestos dust, proper work procedures, personal protection and engineering controls. I have satisfactorily completed and Asbestos Safety Training Program for New York State and have been issued a New York State Department of Health Certificate of Asbestos Safety Training.

MEDICAL EXAMINATION: I have satisfactorily completed a medical examination within the last 12 months that meets the OSHA requirement for an asbestos worker and included at least 1) medical history 2) pulmonary function 3) medical examination 4) approval to wear respiratory protection devices and may have included an evaluation of a chest x-ray.

Signature: _____ Date: _____

Printed Name: _____ SS#: _____

Witness: _____ Date: _____

North Rockland CSD: HS Chiller Replacement & HVAC Upgrades

ESTIMATE OF ACM QUANTITIES

EACH ABATEMENT CONTRACTOR SHALL READ AND ACKNOWLEDGE THE FOLLOWING NOTICE. A SIGNED AND DATED COPY OF THIS ACKNOWLEDGMENT SHALL BE SUBMITTED WITH THE ABATEMENT CONTRACTOR'S BID FOR THIS PROJECT. FAILURE TO DO SO MAY, AT THE SOLE DISCRETION OF THE OWNER, RESULT IN THE BID BEING CONSIDERED NON-RESPONSIVE AND RESULT IN DISQUALIFICATION OF THE ABATEMENT CONTRACTOR'S BID ON THIS PROJECT.

*** NOTICE ***

The linear and square footages listed within this specification are approximates. Abatement Contractor is required to visit the work locations prior to bid submittal in order to take actual field measurements within each listed location. The Abatement Contractor shall base their bid on actual quantities determined, by them, at the site walkthrough. Estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project.

Acknowledgment: I have read and understand the above NOTICE regarding removal quantity estimates and understand that estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project. The Abatement Contractor's signatory represents to the Owner that he/she has the authority of the entity he/she represents to sign this agreement on its behalf.

Company Name: _____
Type or Print

BY: _____
Signature Title Date

Print Name: _____

ASSOCIATED ASBESTOS REMOVAL LOCATION DRAWINGS

○ **North Rockland CSD: HS Chiller Replacement & HVAC Upgrades**

- ✦ **AA-000** – Asbestos Abatement Notes
- ✦ **AA-100** – Mechanical Room – ACM Removals

END OF SECTION 020800

SECTION 024119 - SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of building or structure.

B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse .
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

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

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Roofing System .
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least 24 hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during

selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- B. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075113 Built up asphalt roofing for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 032100**STEEL CONCRETE REINFORCEMENT****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 031100.
- B. Cast-In-Place Concrete: Section 033000.

1.03 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ACI SP66 – ACI Detailing Manual
 - 2. ACI 318 – Latest Edition “Building Code Requirements for Reinforced Concrete”
 - 3. ASTM A 185 – Steel Welded Wire Fabric, Plain, For Concrete Reinforcement
 - 4. ASTM A615/A615M – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 5. ASTM A706/A706M – Low Alloy Steel Deformed Bars for Concrete Reinforcement
 - 6. ASTM A775/A775M – Epoxy Coated Reinforcing Steel Bars
 - 7. AWS D1.4 – Structural Welding Code – Reinforcing Steel

1.04 SUBMITTALS

- A. Shop Drawings: Placing drawings for all reinforcing steel and bending diagrams. Machine-duplicated copies of Contract Drawings will not be accepted as shop drawings. Shop drawings shall be standard 24 by 36 inch size sheets, except that erection drawings may be larger. The margin line shall be drawn a minimum of 1/2 inch from edge of sheet. The title block shall be placed in the lower right hand corner of the drawing, and shall contain the fabricator’s name, address, and telephone number. Failure to submit legible drawings of required size will be cause for their disapproval without review.
 - 1. When shop drawings are marked “Approved as Noted”, promptly resubmit copies of corrected shop drawings for formal approval and record.
 - 2. Contract Drawings are not considered released for construction. Orders for materials may be placed only after approval of erection drawings or written approval of the Director.
- B. Certificates: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.

1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement

1.05 Delivery, Storage, and Protection

- A. Reinforcing steel shall be stored off the ground and protected from oil or other materials detrimental to the steel or bonding capability of the reinforcing bar.
- B. Epoxy-Coated Bar Reinforcement: Deliver, store and handle reinforcement in accordance with fabricator's recommendations and as specified.
 1. Use padded or nylon bundling bands.
 2. Lift and hoist bundles of bars with nylon or padded wire rope slings at the third points or use spreader bars.
 3. Store bars on wood or padded cribbing.
 4. Do not drop bars, and do not drag bars over the ground or over other bars.

1.06 LEED Design Submittals:

1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Placement: Place all bars in accordance with CRSI "Recommended Practice for Placing Reinforcing Bars".
- B. Tolerances: Place bars used for top reinforcement in slabs to a vertical tolerance plus or minus 1/4-inch. Place all other reinforcement to the tolerances given to ACI 318.
- C. Cleaning: Have reinforcing steel delivered without rust other than that accumulated during transportation to the work. At all times, fully protect reinforcing steel from moisture, grease, dirt, mortar and concrete. Before being placed in position, thoroughly clean reinforcing steel of all loose mill scale and rust and of any dirt, oil, grease coatings, or other material that might reduce the bond. If there is a delay in depositing concrete, inspect and satisfactorily clean the steel immediately before the concrete is placed.

- D. Bar positioning: Place bars in the exact positions shown with the required spacing and cross wire bars securely in position at intersections to prevent displacement during the placing of the concrete. Fasten the bars with annealed wire of not less than 17 gauge or other approved devices.
- E. Bar Extension Beyond Formwork: ON any section of the work where horizontal bars extend beyond the length of the forms, perforate the form of head against which the work ends or at the proper places to allow the bars to project through a distance at least equal to the lap specified.
- F. Unacceptable Materials: Do not place reinforcing steel with damaged, unsuitably bonded epoxy-coating or rusting. If approved, mars, exposed threads of mechanical connections, and cut ends may be field coated with approved epoxy coating material.
- G. Review of Placement. Have reinforcing placement reviewed by the third-party inspector before concrete is placed.
- H. Welding – Not approved: Do not use reinforcing bar assemblies made by welding of any kind, or accessories of any kind which require field welding to reinforcing bars.
- I. Welding – Approved: Where welding of reinforcing steel is shown, AWS D1.4 “Structural Welding Code – Reinforcing Steel” applies.
- J. Tension and Compression Lap Splices: Conform tension and compression lap splices to ACI 318 with all supplements. Avoid splices at points of maximum tensile stress wherever possible. Provide temperature bars with clear spacing shown. Stagger all bar splices in hoop tension bars in circular tanks with not more than 50 percent of bars spliced in any one direction. Have welded splices made by certified welders in accordance with AWS D1.4.
- K. Concrete Cover: Place reinforcing steel and welded wire fabric and hold in position so that the concrete cover, as measure from the surface of the bar or wire to the surface of the concrete, is as shown or specified.

END OF SECTION

SECTION 033000**CAST-IN-PLACE CONCRETE****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 031100.
- B. Steel Concrete Reinforcement: Section 032100.

1.03 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of American Concrete Institute (ACI) and American Society for Testing and Materials (ASTM) documents.
 - 1. ACI 117-10: Specifications for Tolerances in Concrete Construction and Materials
 - 2. ACI 212.3R-10: Report on Chemical Admixtures for Concrete; Chapter 15 Permeability Reducing Admixtures
 - 3. ACI 301-16: Specification for Structural Concrete for Buildings.
 - 4. ACI 302.1R-15: Guide for Concrete Floor and Slab Construction.
 - 5. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 - 6. ACI 308.1-11: Standard Specification for Curing Concrete.
 - 7. ACI 318 -14 Building Code Requirements for Structural Concrete.
 - 8. ACI 360R-10: Guide to Design of Slabs on Grade
 - 9. ASTM C 94/C 94M – 11b: Standard Specification for Ready- Mixed Concrete.
 - 10. ASTM C 494/C 494M - 11: Standard Specification for Chemical Admixtures for Concrete.
 - 11. ASTM F 710- 11: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

1.04 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. Corrosion Inhibitor Admixture: Brand and manufacturer's name.
 8. Accelerating Admixture: Brand and manufacturer's name.
 9. Aggregates: Name and location of source, and DOT test numbers.
 10. Lightweight Coarse Aggregates: Brand and manufacturer's name.
 11. Chemical Hardener (Dustproofing): Brand and manufacturer's name, and application instructions.
 12. Chemical Curing and Anti-Spalling Compound: Brand and manufacturer's name, and application instructions.
 13. Bonding Agent (Adhesive): Brand and manufacturer's name, and preparation and application instructions.
 14. Expansion Joint Fillers: Brand and manufacturer's name.
 15. Waterstop: Brand and manufacturer's name, and installation instructions.
 16. Emery Aggregate: Brand and manufacturer's name, and application instructions.
 17. Integral Water-Repellent Admixture: Brand, manufacturer name, specifications, and application instructions.
- C. Quality Control Submittals:
1. Batching Plant Records: At the end of each day of placing concrete, furnish the Director's Representative with a legible copy of all batch records for the concrete placed.
 2. Concrete Pumping Equipment Data: Include manufacturer's name and model of principal components, type of pump, and type and diameter of pipe/hose.
 3. Minutes of the previous pre-installation conference.
- D. LEED Design Submittals:
1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
 2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

1.05 QUALITY ASSURANCE

- A. Qualifications of Crew Pumping Concrete: Workers pumping concrete shall have had at least one year of experience pumping concrete.

- B. Pre-Construction Conference: A minimum of 14 days prior to the initial submission of shop drawings, a conference will be held by the Contractor at the Site for the purpose of reviewing the Contract Documents, and discussing the requirements and procedures for submittals and for the Work. The conference shall be attended by the Contractor, the concrete supplier representative, the reinforcement fabricator's project coordinator, and a representative of the Structural Engineer.
 - 1. If resilient flooring is to be placed on slab-on-grade, the meeting will also include discussion of curing procedures and moisture mitigation measures.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C 150, Type I or II Portland cement.
- B. Water: ASTM C94 and Potable
- C. Air-entraining Admixture: ASTM C 260
- D. Mid-Range Water-reducing Admixture: ASTM C 494/C 494M, Type A
- E. High Range Water-reducing Admixture (Superplasticizer): ASTM C 494/C 494M, Type F
- F. Corrosion-Inhibiting Admixture: ASTM C 494/C 494M, for use in resisting corrosion of steel reinforcement.
- G. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting.
- H. Accelerating Admixture: Non-corrosive admixture, containing no chloride, complying with ASTM C 494, Type C or E
- I. High Range Water-reducing and Retarding Admixture: ASTM C 494, Type G
- J. Fly Ash: ASTM C 618, Class F
- K. Fine Aggregates: ASTM C33
- L. Normal Weight Aggregates: ASTM C33, 3/4" maximum
- M. Lightweight Aggregates: ASTM C 330
- N. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C 171.
 - 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. MasterKure CC 180 WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
 4. Cure & Seal 25 UV (J-22 UV) by Dayton Superior Corp., 1125 Byers Rd.,, Miamisburg, OH 45342, (800) 745-3700.
 5. Acrylseal HS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
- O. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate.
1. MasterKure HD 300WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990..
 2. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.
 3. Liqui-Hard by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.
 4. FluoHard by L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (402) 453-6600.
 5. Armortop by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
 6. Diamond by Kaufman Products , Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
- P. Emery Aggregate: Natural emery, crushed, polyhedral in shape, with not more than 10 percent flat or elongated pieces, properly screened, graded and packaged in the manufacturer's plant, and delivered to the Site in sealed, labeled packages.
1. Emerundum by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
 2. Non-Slip Aggregate by Setcon Industries, Inc., 5 Mathews Ave., Riverdale, NJ 07457-1020, (201) 283-0500.
 3. MasterTop 120SR by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
- Q. Expansion Joint Dowels: Smooth steel expansion joint dowel with minimum 5-inch-long steel dowel cap, unless otherwise indicated.

2.02 PROPORTIONING OF MIXES

- A. Cast-in-place concrete shall be air-entrained normal weight concrete except where lightweight concrete is indicated on the drawings.
1. Normal weight concrete shall have a minimum compressive strength as specified on the drawings.
 - a. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) a maximum of 6 inches after the addition of mid-range water-reducing admixture, and a maximum of 8 inches after addition of high range water reducing admixture.
 2. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight and lightweight concrete at 15 percent to 25 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.

- a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.
 - b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.
3. Lightweight concrete shall be air-entrained concrete, comply with the requirements of ACI 211 and ACI 301, and have a minimum compressive strength as indicated on the drawings. Lightweight concrete shall be made with normal fine aggregate; lightweight fine aggregate shall not be used.
 - a. Dry unit weight shall not exceed 116 pounds per cubic foot and not be less than 110 pounds per cubic foot.
 - b. Slump: Maximum 4 inches; minimum 1 inch before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers), a maximum of 6 inches after the addition of mid-range water-reducing admixture, and a maximum of 8 inches after addition of high range water reducing admixture.
- B. 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.
- C. Design Air Content: Design air content shall be 5 percent for air-entrained concrete with an allowable tolerance of plus or minus 1.5 percent for total air content, 3" maximum for non-air entrained concrete, and 4 percent minimum for light weight concrete. Use air-entraining admixture, not air-entrained cement.
- D. Water-Cement Ratio: Cast-in-place concrete shall have a maximum water-cement ratio as indicated on the drawings.
- E. Application Rate for Corrosion-Inhibiting Admixture: The application rate for the corrosion-inhibiting admixture shall be _____ gallons per cubic yard of concrete for all concrete placements where indicated on the drawings.'
- F. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Engineer.
- G. Application Rate for Integral Water Repellent Admixture:
 1. Apply water repellent admixture to concrete mix at ready-mix plant in accordance with manufacturer's written instructions and approved test batches.

2.03 PRODUCTION OF CONCRETE

- A. Provide ready-mixed concrete, either central-mixed or truck-mixed, unless otherwise approved in writing by the Engineer.

- B. 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 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 concrete surfaces exposed to view.
 3. Smooth Rubbed Finish for exterior concrete surfaces exposed to view.
 4. Grout Cleaned Finish for interior concrete surfaces exposed to view.

3.04 SLABS

- A. Slabs On Grade: Provide key type joints unless otherwise shown. Tool exposed joints.
- B. 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 Finish for:
 - a. Exterior slabs.
 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.
 5. Integral Emery Aggregate Surfacing with Floated Finish for:
 - a. Interior pedestrian ramps.
- C. Exposed surfaces with fibrous reinforcement: After curing of the concrete, remove any protruding fibers in a manner which will not harm the parent concrete.
- D. Floor flatness and levelness tolerances: For flatness and levelness tolerances of floor slabs refer to ACI 302 Chapter 10.1. 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.

3.05 REPAIR OF DEFECTS

- A. After forms have been removed, any concrete which is not constructed as shown on the plans or is out of alignment or level beyond required tolerances or which shows a defective surface which, in the opinion of the Engineer, cannot be properly repaired or patched shall be removed.
- B. Where cast-in-place concrete exposed to view (including under the pier) requires repairing or patching, the texture and color of the surface of such repair or patch shall closely match that of the surrounding surface.
- C. All tie holes and all repairable defective areas shall be patched immediately after form removal as follows:
 1. All honeycombed concrete shall be chipped out to sound concrete along neat lines, but in no case to a depth of less than 1 inch. If possible, edges of the chipped-out areas shall be slightly undercut.
 2. Rock pockets, form tie holes, deep holes not too large in area, other holes with relatively high ratio of depth to area, and similarly confined areas shall be dry packed. After the area to be patched has been thoroughly cleaned and dampened, the mortar, which shall consist of 1 part cement, 2-1/2 parts sand passing a #16 screen, and only enough water to produce a mortar that will stick together upon being molded into a ball by slight pressure of the hands, shall be placed in the holes in layers having a compacted thickness of about 3/8". Each such layer shall be solidly rammed over its entire surface using a hardwood stick and a hammer.
 3. Shallow depressions where lateral restraint cannot be obtained, voids behind reinforcement, and holes extending through concrete sections shall be patched using a commercially prepared bonding agent and a stiff mortar mix of 1 part cement and not more than 2-1/2 parts sand. For filling holes in exterior surfaces, an epoxy bonding agent shall be used. Application of the bonding agent shall be in strict conformance with the manufacturer's instructions.
 4. An epoxy-and-sand mixture may be used in lieu of the mortar-and-bonding agent mixture for any of the patching above. The preparation of the surface to receive the patch, as well as the mixture proportions of the epoxy and sand, shall be in strict conformance with the manufacturer's instructions.
- D. Except for concrete required to be removed under paragraph 3.6 A, any concrete which is not constructed as shown on the plans or is out of alignment and/or level beyond allowable tolerances may be patched using an epoxy-and-sand mixture. The proportions of the mix and the preparation of the surface to receive the patch shall be in strict conformance with the manufacturer's instructions except as otherwise specified herein. The minimum thickness of the patch shall be 1/4". No "feathering" to a lesser thickness will be permitted. Misalignment which requires correction more than 1 inch thickness shall be repaired in the following manner:

1. The surface of the affected area shall be chipped, etched, or otherwise cleaned and roughened to provide a sound surface for bonding;
 2. Concrete nails or other fasteners which can provide positive mechanical bonding of the patch shall be set into the surface at about 18 inches o.c. in all directions with a minimum of 2 rows;
 3. Reinforcement as approved by the Engineer shall be installed in those portions of the patch which exceed 2 inch thickness;
 4. A bonding agent suitable for use in the repair location (epoxy required for exterior use) shall be applied over the entire surface to be patched;
 5. Formwork to the true lines called for shall be installed over the area requiring the patch; and
 6. Concrete or grout with aggregate sized appropriately for the cavity and which will provide strength equivalent to that of the base surface shall be placed in the form, properly compacted, finished, and suitably cured.
- E. Shrinkage and temperature cracks in exposed concrete except slabs on grade shall be patched by veeing out the crack to a minimum width and depth of 1/4" and filling solid with epoxy mortar. Whenever necessary, the Engineer may require cracks be repaired and patched by epoxy injection and require the Contractor to submit methods of repair for approval before the commencement of the repair work.

3.06 CURING AND PROTECTION

- A. 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.
- B. 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.
- C. Curing and Moisture Mitigation for Resilient Flooring:
1. Acceptable curing and drying conditions include a minimum ambient temperature of 70 degrees F and a maximum relative humidity of 50%.
 - a. Air movement at 15 mph.
 2. Do not cure slabs by adding water; ponding or wet burlap method.
 3. Do not use curing compounds or cure-and-seal materials unless such use is approved in writing by the adhesive and floor covering manufacturers. The curing product manufacturer's conformance to ASTM C 1315 is not a substitute for the adhesive and floor covering manufacturer's approval.
 4. Cure the slab by covering with waterproof paper, plastic sheets, or a combination of the two for 3 to 7 days.

3.07 CHEMICAL HARDENER (DUSTPROOFING)

- A. Apply chemical hardener to all troweled finished interior floors which are to be left exposed.

- B. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.
- C. Prepare surfaces and apply chemical hardener in accordance with manufacturer's printed instructions and recommendations.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspection agency to perform tests and inspections and submit reports.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain on composite sample of each day's pour of each concrete mixture exceeding 5 cu yd, but less than 25 cu yd, plus one set for each additional 50 cu yd or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and field cure five standard cylinder specimens for each composite sample.
 - 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two field cured specimens at 7 days and one set of two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - b. Additional specimen shall be held for test at 56 days in case of low test results.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- C. Test results will be reported in writing to the Engineer, Ready-Mix Producer, 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.
- D. 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.
- E. Additional Tests: The Engineer 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 Engineer. The testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Pay for such tests when unacceptable concrete is verified, including all inspection and Engineering fees when non-conforming work is verified.
- F. Moisture Testing: Test all slabs-on-grade for moisture content that will receive resilient flooring. For a preferred moisture testing method and limits; consult the written instructions of the floor covering manufacturer, the adhesive manufacturer, the patching/underlayment manufacturer, or combination thereof. Test repeatedly until the desired moisture content is obtained.
- G. pH Testing: Test concrete floors for pH level prior to the installation of resilient flooring. Do not exceed the recommended pH level of the resilient flooring manufacturer or the adhesive manufacturer, or both.

END OF SECTION

SECTION 051200**STRUCTURAL STEEL****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Anchor Bolts: Installed under Section 033000 or 033001.

1.03 REFERENCES

- A. Design, Fabrication, and Erection: "Specification for Structural Steel Buildings", by the American Institute of Steel Construction (AISC Specification).
- B. Fabrication and erection practices shall comply with the "Code of Standard Practice for Steel Buildings and Bridges", by the American Institute of Steel Construction (AISC Code).
- C. Welding shall comply with the provisions of the "Structural Welding Code - Steel, AWS D1.1", by the American Welding Society (AWS Code).
- D. High-Strength Bolting: High-strength bolting shall comply with the "Specification for Structural Joints Using High-Strength Bolts" (Specification for Structural Joints).
- E. Cleaning Steel: Comply with the appropriate specifications (SSPC SP-X) by the Steel Structures Painting Council.
 - 5. Cleaning Steel: Comply with the appropriate specifications (SSPC SP-X) by the Steel Structures Painting Council.

1.04 REQUIREMENTS FOR CONNECTIONS

- A. General:
 - 1. Do not use connection details which depend upon sharing the stress between any combination of high-strength bolts in bearing-type connections and welds.
 - 2. Size connections for the loads indicated on the Drawings. If the loads are not indicated, use a connection whose capacity is half the total uniform load capacity shown in the "Allowable uniform loads in kips for beams laterally supported" tables in the AISC Manual for the given shape, span, and steel specification of the beam in question, unless otherwise indicated.
 - 3. All bolted connections shall have a minimum of two bolts.
- B. Shop Connections: Unless otherwise indicated, all shop connections shall be welded or high strength bolted. Field connections required to be welded or fully-

tensioned high-strength bolted shall meet the same requirements when fabricated in the shop.

C. Field Connections:

1. The following field connections shall be welded or fully-tensioned high-strength bolted as shown or noted on the Drawings or, when not shown or noted, shall be either welded or fully-tensioned high-strength bolted at the Contractor's option:
 - a. Column splices.
 - b. Roof truss splices.
 - c. Column bracing.
 - d. Connections for supports of machinery.
 - e. All connections of trusses to columns.
 - f. All connections of eave struts, eave purlins, first interior purlins, ridge beams, and ridge purlins to rigid frames and trusses.
2. All other bolted field connections need only be tightened to the snug tight condition.
3. When steel members of any cross section are to be spliced by welding in the field, a detailed welding procedure shall be submitted to the Engineer for approval. The procedure shall be detailed on shop drawings, submitted and approved prior to the fabrication of structural steel. The detailed field welding procedure shall include the method of supporting members during welding. All field welded splices shall be subject to non-destructive testing, Radiographic Testing (RT), or Ultrasonic Testing (UT), as determined by the Engineer. Field splice locations, when specifically shown on contract documents, shall not be relocated nor shall splices be added without written approval of the Engineer.

D. Standard Beam Connections:

1. Unless otherwise shown on the Drawings or required in the Specifications, all beam connections shall be framed in accordance with Part 10 of the AISC Manual, with sizes and lengths of angles and welds and with fastener spacings as shown therein.
2. Standard beam connections shown on the Drawings shall be fabricated as detailed. Substitutions will not be approved.

1.05 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for all structural steel required by this Contract. Machine-duplicated copies of Contract Drawings will not be accepted as shop drawings. Shop drawings shall be standard 24 by 36 inch size sheets, except that erection drawings may be larger. The margin line shall be drawn a minimum of 1/2 inch from edge of sheet. The title block shall be placed in the lower right hand corner of the drawing, and shall contain the fabricator's name, address, and telephone number. Failure to submit legible drawings of required size will be cause for their disapproval without review. If the drawings are not prepared by a detailer under the direct control of the fabricator, the fabricator shall stamp each drawing and initial or sign the stamp to certify review and

approval of the drawings, and conformance with the fabricator's shop practice and capability.

1. Include the following in the initial submission:
 - a. Drawings of proposed job standards for shop and field connections, including standard and special connections, complying with the requirements.
 - b. Erection drawings indicating sizes, weights, and locations of all structural members.
 - c. Anchor bolt and base plate plans.
2. Do not submit detail drawings, other than for anchor bolts and base plates, until after approval of the job standards and the erection drawings.
3. All shop drawings shall be checked by the detailer before submission. Failure to submit checked shop drawings will be cause for their disapproval without review.
4. Changes initiated by the detailer or fabricator to previously reviewed shop drawings shall be resubmitted.
5. Include the following in subsequent submissions:
 - a. Index sheets and revised erection drawings to which erection marks have been added.
 - b. Detail drawings of all structural members.
6. Indicate all required shop and field welds by Standard AWS Welding Symbols in accordance with AWS A2.4.
7. Indicate shop painting requirements.
8. When shop drawings are marked "Approved as Noted", promptly resubmit copies of corrected shop drawings for formal approval and record.
9. Contract Drawings are not considered released for construction. Orders for materials may be placed only after approval of erection drawings or written approval of the Director.

B. Product Data:

1. Shop Paint: Manufacturer's name and printed product literature, including storage and application instructions.

C. Quality Control Submittals:

1. Test Reports: Submit test reports no later than the end of the week covered by the reports. Submit copy of each test report required under Quality Assurance Article.
2. Certificates: Certificates required under Quality Assurance Article.
3. Fabricator's Qualifications Data:
 - a. Firm's name, business address and telephone number.
 - b. Summary of their quality control programs.
4. Erector's Qualifications Data:
 - a. Firm's name, business address and telephone number.
 - b. Summary of their quality control programs.
5. Welder's Qualifications Data:
 - a. Name of each person who will be performing the Work and their employer's name, business address and telephone number.
 - b. Copy of AWS certification for type of welding required.

- D. LEED Design Submittals:
1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
 2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

- A. Test Reports:
1. Steel Manufacturer's Mill Test Reports: Covering physical and chemical tests, for all main material.
 2. Bolt Manufacturer's Test Reports: Covering physical and chemical tests, for each lot of high strength bolts supplied.
- B. Certification: Affidavit by the structural steel manufacturer certifying that structural steel items meet the contract requirements.
1. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
 - a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
 2. The Contractor agrees, that if the value of this contract exceeds \$100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.
- C. Qualifications:
1. Fabricator's Qualifications: The fabricator of the structural steel shall be regularly engaged in the fabrication of structural steel for a minimum of 5 years, and shall be subject to the approval of the Engineer.
 - a. AISC Quality Certified Fabricators (latest list issued) are approved.
 2. Erector's Qualifications: The structural steel erector shall be regularly engaged in the erection of structural steel for a minimum of 5 years, and shall be subject to the approval of the Engineer.
 3. Welders' Qualifications: Welding shall be performed only by welders, welding operators, and tackers who have been qualified by tests as prescribed in the AWS Code to perform the type of welding required. Welders shall be certified for each type weld and position before fabrication.
- D. Do not deviate from the requirements of the Contract Documents except where an option is specifically mentioned. The Engineer, however, may accept

deviations proposed by the Contractor when it is deemed in the best interest of the project and if the deviations are consistent with sound and accepted engineering practice. Requests for deviations shall be made prior to the submission of shop drawings to preclude delay in the expeditious preparation and approval of the required shop drawings. In addition, design calculations or other data may be required to establish conformity of such deviations with the applicable Standards.

- E. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.
- F. Pre-Fabrication Meeting: A minimum of 14 days prior to the initial submission of shop drawings, a meeting will be held at the Site for the purpose of reviewing the Contract Documents, and discussing the requirements and procedures for submittals and for the Work. The meeting will be conducted by the Contractor and the fabricator's project coordinator and certified welding inspector must attend the meeting. A representative of the Structural Engineering will also attend.

1.07 QUALITY ASSURANCE

- A. Examine Drawings and Specifications prior to bidding or executing work. Notify the Engineer immediately should omissions or errors be discovered.
- B. All welders, both shop and field, shall be certified qualified operators, in accordance with the requirements of the American Welding Society.
- C. Quality Control Inspection: Maintain Quality Control (QC) inspection during the fabrication and erection of structural steel.
 - 1. Submit for approval a summary of the QC programs of the proposed fabricator and erector, including a list of their QC personnel and respective duties. Failure to obtain approval of the QC programs will result in rejection of the proposed fabricator and erector. AISC Quality Certified Fabricators submit copy of QC Certificate (Submission of QC program summary is waived).
 - 2. At least one of the fabricator's and one of the erector's QC personnel shall be an American Welding Society Certified Welding Inspector (CWI).
 - 3. The fabricator's CWI shall make minimum QC inspections as follows and shall prepare daily reports of such inspections:
 - a. At the start of fabrication to review welder qualifications, welding procedure specifications and qualifications, welding equipment and consumables, structural steel identification and tracking procedures and to perform all other CWI duties appropriate to start up of the specific project.
 - b. Periodically during the preparation and fit up of material for groove welding.
 - c. At all times that full penetration groove welding is being performed.
 - d. As necessary to ensure that all welding related requirements of this section are being complied with.
 - 4. The erector's CWI shall make minimum QC inspections as follows, and shall prepare daily reports of such inspections:

- a. Prior to commencement of field welding operations to review welder qualifications, welding procedure specifications and qualifications, welding equipment and consumables and to perform all other CWI duties appropriate to start up of field welding for the specific project.
- b. Periodically during fit-up of material for full penetration groove welds.
- c. At all times that full penetration groove welding is being performed.
- d. As necessary to ensure that all welding related requirements of this section are being complied with.

1.08 WELDING PROCESSES

- A. Use only shielded metal arc, submerged arc, gas metal arc, or flux cored arc welding.

1.09 WELDING PROCEDURE QUALIFICATION

- A. Shielded metal arc, submerged arc, gas metal arc, or flux cored arc welding procedures which conform to the provisions of the AWS Code shall be considered to be prequalified.
- B. The welding procedures requiring qualification shall conform to the requirements of AWS D1.1.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver anchor bolts and other devices which are to be embedded in cast-in-place concrete or masonry construction, for anchorage of structural steel, one week prior to the start of that Work, unless otherwise required.
- B. Receiving Shop Paint: Receive paint in original, unopened containers bearing paint manufacturer's printed label.
 1. Label shall show manufacturer's name, trade name of paint, Federal Specification compliance (if applicable), shelf life, and date of manufacture.
- C. Protection:
 1. Upon delivery to the site, promptly cover and protect steel items (which are not required to receive shop paint) from rusting.
 2. Store shop paint in accordance with paint manufacturer's printed instructions.

1.11 ENVIRONMENTAL REQUIREMENTS FOR SHOP PAINTING

- A. Comply with the following conditions for the application of paint unless otherwise stated in the paint manufacturer's printed directions.
 1. Minimum ambient, steel surface, and paint temperatures: 40 degrees F.
 2. Maximum steel surface temperature: 100 degrees F.
 3. Maximum relative humidity: 85 percent.

4. Surface of steel: Dry.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wide Flange Structural Steel: ASTM A-992
- B. Steel plates, bars and rods: ASTM A 36.
- C. High-Strength Threaded Fasteners (High-Strength Bolts): ASTM A 325 heavy hexagon structural bolts, nuts, and hardened washers.
- D. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- E. Steel Hollow Structural Sections (Round, Square, or Rectangular): ASTM A 500, Grade B; or ASTM A 500, Grade C.
- F. Weld Filler Metal:
 1. General: Weld filler metal shall be in accordance with Table 4.1.1 of the AWS Code, except as follows:
 - a. Only electrode and flux combinations complying with AWS Classifications F7AX-EXXX or F7AX-EXXX-a, (a = B2, Ni1, Ni2, Ni3 or W), shall be used for submerged arc welding.
 - b. Only electrode and shielding gas combinations complying with AWS Classifications E 7XT-1 or E 7XT-5 shall be used for flux cored arc welding.
 2. Weld filler metal for shielded metal arc, submerged arc, gas metal arc, and flux cored arc welding which conforms to AWS Specifications A5.1 or A5.5 shall be considered to be prequalified.
- G. Headed Steel Studs: Automatic arc welded studs complying with Section 7 of the AWS Code.
- H. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film, and meeting the requirements of DOD-P-21035A (NAVY).
- I. Shop Paint (General): Steel primer selected from the following:
 1. TNEMEC 10-99 (Red), 10-99G (Green) or 10-1009 (Gray).
 2. Rust-Oleum 769.
 3. Valspar 13-R-53.
 4. Sherwin-Williams "Kromik".
- J. Shop Paint for Galvanized Steel: FS TT-P-641, Type II.
- K. Steel to receive Sprayed-On Fireproofing shall not be shop primed.
- L. Shop Paint for Exterior Structural Steel (High-Ratio Water Based Inorganic Zinc Silicate): Steel primer selected from the following:

1. Sherwin Williams ZincClad X1.
2. Carboline Carbozinc 18 WB.

2.02 FABRICATION

- A. Progress shop fabrication from “NO EXCEPTIONS TAKEN” detail drawings only.
 1. When detail drawings are “NO EXCEPTIONS TAKE” and “MAKE CORRECTIONS NOTED”, progress fabrication in strict accordance with notes thereon.
 2. Fabrication progressed from “REJECTED” or “MAKE CORRECTIONS AS NOTED” detail drawings will be rejected. The contractor shall have no claim for any costs or delays due to rejection of items fabricated from “REJECTED” or “MAKE CORRECTIONS AS NOTED” detail drawings.
- B. Finish column ends at base plates and at load carrying cap plates to a true plane square to the column, with a maximum American National Standards Institute surface roughness value of 500 microinches.
- C. Pipe and Tube Columns: Cap columns with a closure plate shop welded to the top of the columns to exclude water and foreign material from entering the column.
- D. Loose Lintels: Loose lintels bearing on masonry or concrete shall have a minimum end bearing length of 6 inches at each end, unless otherwise noted.
- E. Make provision for connections of other Work, including all cutting and punching of structural members where required by the Drawings, or for which information is furnished prior to approval of the shop drawings.
- F. Weld and inspect steel studs in accordance with Section 7 of the AWS Code.
- G. Remove extension bars or run-off plates upon the completion and cooling of groove welds. Grind the ends of the welds smooth and flush with the edges of the abutting parts.
- H. Remove tack welds not incorporated into the final weld, and temporary welds. Grind affected surfaces smooth and flush.
- I. Detail all fillet welded joints so as to permit the welding electrode or wire to be positioned at a minimum angle of 30 degrees from the face of any material upon which weld metal is to be deposited.
- J. Prepare material in accordance with Section 3 of the AWS Code. Do not use gas or air carbon-arc cutting to cut or enlarge bolt holes.

2.03 GALVANIZING

- A. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
 - 1. ASTM A 123 for plain and fabricated material.
 - 2. ASTM A 153 for iron and steel hardware.

PART 3 EXECUTION

3.01 ERECTION

- A. Erect steel in accordance with the AISC Specification, the AISC Code, the AWS Code and the Specification for Structural Joints, except as otherwise specified.
- B. Prepare and place shrink-resistant grout in accordance with grout manufacturer's printed instructions.
 - 1. Comply with manufacturer's instructions for preparation of surfaces in contact with the grout, and for curing and protection of the grout.
- C. Remove extension bars and run-off plates upon the completion and cooling of groove welds. Grind the ends of the welds smooth and flush with the edges of the abutting parts.
- D. Remove tack welds not incorporated into the final weld, and temporary welds. Grind affected surfaces smooth and flush.
- E. Do not make corrections or alterations to fabricated steel without prior written approval by the Engineer.

3.02 SCHEDULE OF GALVANIZED STRUCTURAL STEEL

- A. In addition to members indicated on the Drawings, hot-dip galvanize structural steel members as indicated below.
 - 1. All exterior exposed steel.
 - 2. All loose lintels in exterior walls.
 - 3. All framing supporting refrigerator/freezer equipment.
 - 4. Nuts, washers and the top 12 inches of exterior anchor bolts.
- B. Two shop coats of High-Ratio Water Based Inorganic Zinc Silicate paint may be substituted in lieu of hot-dip galvanizing.

END OF SECTION

SECTION 075113 - BUILT-UP ASPHALT ROOFING

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. Built-up asphalt roofing.
 - 2. Substrate board.
 - 3. Roof insulation.
 - 4. Materials and application procedures for a unit and curb installation on a built-up roofing system.
- B. Section includes the installation of 3 ply flashing at new curb locations. Tie into existing roofing system.
- C. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- C. Warranties: Special warranties specified in this Section.

1.6 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer.
 - 1. Protect stored liquid material from direct sunlight.
 - 2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.
 - 1. Store in a dry location.
 - 2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes roofing membrane, base flashings, new curbs, new flashing and other components of roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and 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. Roof system and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 - 2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/C3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
- D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.
 - 1. ASCE 7 minimum uplift resistance, calculated using a safety factor of 2:
 - a. Field Zone: 70 psf
 - b. Perimeter Zones: 115 psf
 - c. Corner Zone: 175 psf
- E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency.
 - 1. Identify products with appropriate markings of applicable testing agency.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation.
 - 2. Ecology Commercial and Industrial Roofing Systems.
 - 3. Tremco Incorporated.
- B. Source Limitations: Obtain components for roofing system from manufacturer approved by roofing membrane manufacturer.

2.3 BASE FLASHING SHEET MATERIALS

- A. Ply Sheet: Burmastic Composite Ply HT by Tremco Inc.
- B. Cap Sheet: Powerply Standard FR by Tremco Inc.

- C. Liquid Flashing System: Roof membrane manufacturer's standard one- or two-part moisture curing resin with low solvent content, consisting of a primer, flashing cement, and scrim.

2.4 ASPHALT MATERIALS

- A. Asphaltic Primer: Tremprime WB by Tremco Inc.

2.5 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with other roofing components.
 - 1. Reinforcing Mesh: Burmesh by Tremco Inc.
 - 2. Sealant: Polyroof SF by Tremco Inc
- B. Cold Process Adhesive: Powerply Standard Cold by Tremco Inc.
- C. Roof Vents: As recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch diameter.
- D. Sheathing Paper: Red-rosin type, minimum 3 lb./100 sq. ft.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8-inch-thick; with anchors.
- F. Cold-Applied Asphalt Adhesive: ASTM D3019, Type III, roof system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with roofing system and base flashings.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening built-up roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.
- H. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roof membrane manufacturer, approved for use in FM Approvals' RoofNav-listed roof assemblies, approved for use in SPRI's Directory of Roof Assemblies listed roof assemblies.
- B. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 1.6-lb/cu. ft. minimum density, 25psi minimum compressive strength, square edged.
 - 1. Thermal Resistance: R-value of 5.0 per inch.
 - 2. Size39
 - 3. Thickness:
 - a. Curb insulation: 1 1/2 inches.

2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 - 1. Modified asphaltic, asbestos-free, cold-applied adhesive.
 - 2. Bead-applied, low-rise, one-component, or multicomponent urethane adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
 - 4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of **1/16 inch** out of plane relative to adjoining deck.
 - 5. Verify that minimum concrete drying period recommended by roofing manufacturer has passed.
 - 6. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each **1000 sq. ft.**, or portion thereof, of roof deck, with not less than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
 - 7. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.
 - 8. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
 - 9. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
 - 10. Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
 - 11. Verify that adjacent cementitious wood fiber panels are vertically aligned to within **1/8-inch** at top surface.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions.
 - 1. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

1. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Prime surface of concrete deck with asphalt primer at a rate of **3/4 gal./100 sq. ft.**, and allow primer to dry.
- D. Perform fastener-pullout tests according to roof system manufacturer's recommendations.
 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- E. Install sound-absorbing insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.
 1. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.
- D. Asphalt Heating:
 1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application.
 2. Circulate asphalt during heating.
 - a. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application.
 3. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
 4. Do not heat asphalt within **25 deg F** of flash point.
 5. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
 - a. Apply hot roofing asphalt within plus or minus **25 deg F** of equiviscous temperature.
- E. Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing manufacturer's written instructions.
- F. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing components or adjacent building construction.

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than **24 inches** in adjacent rows.
 1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.
 2. Tightly butt substrate boards together.
 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
 5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturer's written instructions.
 6. Loosely lay substrate board over roof deck.
- B. Using a spud bar remove stone gravel from work areas.
- C. Clean and prime existing gravel built up roof with Tremprime WB at 200-400 square feet per gallon and allow to tack.
- D. Apply Tremco Powerply Standard Cold adhesive at two gallons per square per ply to existing roof and new units and apply two plies of Burmastic Composite Ply HT into cold adhesive. Broom plies in for clean tight finish.
- E. Apply Tremco Powerply Standard Cold adhesive at two gallons per square over newly installed two ply and apply Tremco Powerply Standard FR. Broom in for clean finish.
- F. Terminate top of new sheet with termination bar every 6 O.C. and ensure termination bar is counter flashed with slip metal.
- G. Run leading edge of new two ply Burmastic Composite Ply HT base plies as well as Powerply Standard FR cap sheet onto existing roof per drawings. Seal leading edge of new flashing system into existing roof in three course fashion using Polyroof SF and Burmesh.
- H. Seal vertical laps and corners in three course fashion using Polyroof SF and Burmesh.
- I. Push back stone gravel.
- J. Pipe and conduit to receive new copper pitch pockets installed to scope above and filled with Tremco pourable sealer once complete.
- K. Any large repairs required to roof during removal of old units will be as follows. Scratch stone and prime roof. Install Powerply cold adhesive at 2 gallon per square and embed Composite Ply HT to complete 4 ply system. Seal leading edges of patch in three course per above scope with Polyroof and Burmesh. Flood patch with cold asphalt and embed stone.

3.5 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install one lapped base sheet course and mechanically fasten to substrate according to roofing membrane manufacturer's written instructions.
- D. Nailer Strips: Mechanically fasten **4-inch nominal**-, width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
1. **16 feet** apart for roof slopes greater than **1 inch per 12 inches** but less than **3 inches per 12 inches**.
- E. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane with vertical surfaces or angle changes greater than **45 deg**.

3.6 INSTALLATION OF FLASHING AND STRIPPING

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions and as follows:
 - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - 2. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing manufacturer.
- B. Extend base flashing up walls or parapets a minimum of **8 inches** above built-up roofing and **4 inches** onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing.
- D. Install liquid flashing system according to manufacturer's recommendations.
 - 1. Extend liquid flashing not less than **3 inches** in all directions from edges of item being flashed.
 - 2. Embed granules, matching color of roof membrane, into wet compound.
- E. Install stripping according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on roofing membrane.
 - 1. Flashing Sheet Stripping: Install flashing sheet stripping in a continuous coating of asphalt roofing cement, in a solid mopping of hot roofing asphalt applied at not less than **425 deg F**, and extend onto roofing membrane, in cold-applied adhesive, or in cold-applied polymer-modified adhesive.

3.7 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period.
 - 1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing components that do not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075113

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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. Formed equipment support flashing.

B. Related Requirements:

- 1. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

- 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
- 3. Review requirements for insurance and certificates if applicable.
- 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

- 1. Underlayment materials.
- 2. Elastomeric sealant.
- 3. Butyl sealant.

B. Shop Drawings: For sheet metal flashing and trim.

- 1. Include plans, elevations, sections, and attachment details.

2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches .

- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.8 QUALITY ASSURANCE

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with and requirements for dimensions and profiles shown unless more stringent requirements are indicated.

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

- 1. As-Milled Finish: Mill .

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
 - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- F. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams:
1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
 3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.5 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 - 1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 - 8. Do not field cut sheet metal flashing and trim by torch.
 - 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
2. Do not solder metallic-coated steel and aluminum sheet.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.4 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.6 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof curbs.
- B. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 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.
- B. Shop Drawings: For roof accessories.
 - 1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
- D. Delegated-Design Submittal: For roof curbs indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
 - 2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturer's special warranties.

1.6 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

2.2 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported See drawings for list of HVAC unit weights. .
- D. Material: Zinc-coated (galvanized) steel sheet, as required by curb engineer sufficient thickness to support unit loads.
 - 1. Finish: Baked enamel or powder coat .
 - 2. Color: As selected by Architect from manufacturer's full range .
- E. Construction:
 - 1. Curb Profile: Profile as indicated on Drawings compatible with roofing system.
 - 2. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
 - 3. Top Surface: Level top of curb, with roof slope accommodated by use of leveler frame.
 - 4. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
 - 5. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 - 6. Nailer: Factory-installed wood nailer under top flange on side of curb, continuous around curb perimeter.

7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
8. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
9. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation and mill phosphatized for field painting where indicated.
 1. 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. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 coated.
 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.
- C. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 1. 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.
 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.
- D. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.
- E. Steel Tube: ASTM A500/A500M, round tube.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWWPA C2; not less than 1-1/2 inches thick.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Underlayment:
 1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D4397.
 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.

4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- F. 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.
- G. 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.
- H. 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.
- I. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- J. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.5 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. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- E. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- F. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.
- G. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof edge protection. (SafetyRail 2000)
- B. Non-penetrating railing system for roof edge fall protection. (SafetyRail 2000 Architectural Series)

1.2 RELATED SECTIONS

- A. Section 05 50 00 - Metal Fabrications.

1.3 REFERENCES

- A. British Standards:
 - 1. BS 970 - Specification for wrought steels for mechanical and allied engineering purposes. General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels.
 - 2. BS EN 1562 - Founding. Malleable Cast Irons.
 - 3. BS 3100 - Specification for Steel Castings for General Engineering Purposes.
- B. California Occupational Safety & Health Administration (CAL OSHA):
 - 1. 1620 - Design of Temporary Railing.
 - 2. 1621 - Railings and Toe Boards.
 - 3. 1633 - Elevator Shafts to be Guarded.
 - 4. 3209 - Standard Guardrails.
 - 5. 3210 - Guardrails at Elevated Locations.
 - 6. 3211 - Wall Openings.
 - 7. 3212 - Floor Openings, Floor Holes and Roofs.
 - 8. 3213 - Service Pits and Yard Surface Openings.
 - 9. 3214 - Stair Rails and Handrails.
- C. Occupational Safety & Health Administration (OSHA):
 - 1. 29 CFR 1910.23 - Guarding Floor and Wall Openings and Holes.
 - 2. 29 CFR 1910.27 - Fixed Ladders.
 - 3. 29 CFR 1926.500 - Scope, Application, And Definitions Applicable to this Subpart.
 - 4. 29 CFR 1926.501 - Duty to Have Fall Protection.
 - 5. 29 CFR 1926.502 - Fall Protection Systems Criteria and Practices.
 - 6. 29 CFR 1926.503 - Training Requirements.
 - 7. Warning Line Interpretations dated May 12, 2000, November 15, 2002, and January 3, 2005.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. [Product Data]: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Drawings showing plans, elevations, sections and details of components.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in good condition and adequately protected against damage as handrails are a finished product.
- B. Inspect rail sections for damage before signing the receipt from the trucking company. Truck driver must note damaged goods on the bill of lading if damaged product is found.
- C. Store products in manufacturer's unopened packaging until ready for installation.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication.

1.7 WARRANTY

- A. Warranty: Provide manufacture's two (2) year warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: BlueWater Mfg., Inc., distributed by Dakota Safety which is located at: 4155 South Robert Trail Suite 2, Saint Paul MN 55123; Toll Free Tel: 866-503-7245 x7; Fax: 866-503-7245; Email: info@dakotasafety.com; Web: www.dakotasafety.com
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SYSTEMS

- A. SafetyRail 2000 Roof Edge Protection: Provide non-penetrating guardrail system.
 - 1. Approved Product: SafetyRail 2000.
 - 2. Standards: System shall have top and mid rail in accordance with OSHA Standards - 29 CFR 1910.23 (a)(2).
 - 3. Structural Load: 200 lb (90.7 kg), minimum, in any direction to all components in accordance with OSHA Regulation 29 CFR 1926.502.
 - 4. Height: 42 inches (1067 mm), minimum.
 - 5. Railings: 1-5/8 inch (41 mm) O.D. hot rolled pickled electric weld tubing, free of sharp edges and snag points.
 - 6. Mounting Bases: Class 30 gray iron material cast with four receiver posts. Provide rubber pads on bottom of bases.
 - 7. Receiver Posts: Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.
 - 8. Accessories:
 - a. Toe Board Brackets: Provide brackets and friction knobs as manufactured by BlueWater Mfg. Inc.
 - b. Step-Rail: Variable height railing enables a continuous run of SafetyRail 2000 when the roof steps up or down.
 - c. Raised Mid-Rail: Railing to fit over duct work for continuous run of SafetyRail2000.
 - d. LP Outrigger: Supports placed under ducting or conduit to continue run of SafetyRail 2000 when rail section cannot be used.
 - e. SG2000: Sliding gate.
 - f. Finishing Rail: D-shaped railing extension for ladder landings, length of rail section and D-loop as indicated on the Drawings.
 - 9. Hardware: Securing pins shall be 1010 carbon steel, zinc plated and yellow chromate dipped. Pins shall consist of collared pin and lanyard that connects to lynch pin.

2.3 FINISHES

- A. Rail Finish:
 - a. Factory finished powder coat paint – safety yellow. (or custom color as selected by architect from manufacture’s standard colors) over hot dipped galvanized finish.
- B. Base Finish:
 - a. Factory finished powder coat paint – safety yellow. (or custom color as selected by architect from manufacture’s standard colors) over galvanized finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. 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.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
- 2. Penetrations in horizontal assemblies.
- 3. Penetrations in smoke barriers.

B. Related Requirements:

- 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-

adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated construction.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data:

1. Joints in or between fire-resistance-rated construction.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.
 - 1) UL in its online directory "Product iQ."
- B. Rain/Water Resistance: For perimeter fire-barrier system applications, where inclement weather or greater-than-transient water exposure is expected, use products that dry rapidly and cure in the presence of atmospheric moisture sufficient to pass ASTM D6904 early rain-resistance test (24-hour exposure).

2.3 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
 - 1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
 - 2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
 - 3. Provide firestop products that do not contain ethylene glycol.
- B. Intumescent Gypsum Wall Framing Gaskets (Applied to Steel Tracks, Runners, and Studs prior to Framing Installation): Provide products with fire, smoke, and acoustical ratings that allow movement up to 100 percent

compression and/or extension in accordance with UL 2079 or ASTM E1966; have an L Rating less than 1 cfm/ft. in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 in accordance with ASTM E90 or ASTM C919.

- C. For aluminum curtain-wall assemblies with one- or two-piece rectangular mullions at least 2-1/2 by 5 inches, provide perimeter fire-barrier system that does not require direct screw attachment to mullions and transoms to support and fasten curtain-wall insulation. System to be tested in accordance with ASTM E2307 for up to 2-hour fire resistance and with ASTM E1233 for wind cycling equivalent to 108 mph wind for 500 cycles.
- D. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Services.
 - b. Hilti, Inc.
 - c. Owens Corning.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- E. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Services.
 - b. Hilti, Inc.
 - c. Owens Corning.
 - 2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- F. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Services.
 - b. Hilti, Inc.
 - c. Owens Corning.
 - 2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- G. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

2.4 ACCESSORIES

- A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition occurs, such as the intersection of a gypsum wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

3.3 INSTALLATION

- A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..
- B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.

6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections in accordance with ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's online directory "Product iQ" under product Category XHBN or Category XHDG.
- B. Floor-to-Floor, Joint Firestopping Systems: .
 - 1. Assembly Rating: 1 hour 2 hours .
 - 2. Nominal Joint Width: As indicated .
 - 3. Movement Capabilities: Class II - percent compression or extension .
 - 4. W-Rating: No leakage of water at completion of water leakage testing.
- C. Wall-to-Wall, Joint Firestopping Systems: .
 - 1. UL-Classified Systems: WW- D - .
 - 2. Assembly Rating: 1 hour 2 hours .
 - 3. Nominal Joint Width: As indicated .
 - 4. Movement Capabilities: Class II - percent compression or extension.
- D. Floor-to-Wall, Joint Firestopping Systems: .
 - 1. UL-Classified Systems: FW- D - .
 - 2. Assembly Rating: 1 hour 2 hours .
 - 3. Nominal Joint Width: As indicated .
 - 4. Movement Capabilities: Class II - percent compression or extension .
- E. Head-of-Wall, Fire-Resistive Joint Firestopping Systems: .
 - 1. UL-Classified Systems: HW- D - .
 - 2. Assembly Rating: 1 hour 2 hours .
 - 3. Nominal Joint Width: As indicated .
 - 4. Movement Capabilities: Class II - percent compression or extension.

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F. Perimeter Joint Firestopping Systems: .

1. UL-Classified Perimeter Fire-Containment Systems: CW- D - .
2. Integrity Rating: 1 hour 2 hours .
3. Movement Capabilities: Class II - percent compression or extension.
4. F-Rating: 1 hour 2 hours .

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Polysulfide joint sealants.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Polysulfide joint sealants.

- B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

- A. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.
- B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

1.7 MOCKUPS

- A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer.

2.2 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.
- B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.6 POLYSULFIDE JOINT SEALANTS

- A. Polysulfide, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.
- B. Polysulfide, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. .
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. .

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
 - 4. Provide flush joint profile at locations indicated on Drawings in accordance with Figure 8B in ASTM C1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings in accordance with Figure 8C in ASTM C1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - a. Extent of Testing: Test completed and cured sealant joints as follows:
 - 1) Perform 10 tests for the first 1000 ft. of joint length for each kind of sealant and joint substrate.
 - 2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.
 - b. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - c. Inspect tested joints and report on the following:
 - 1) Whether sealants filled joint cavities and are free of voids.
 - 2) Whether sealant dimensions and configurations comply with specified requirements.
 - 3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 - d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

- e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- 2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.2 ACTION SUBMITTALS

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.

1.4 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association .

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Horizontal Deflection: For composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. .
- B. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.
- C. Design Loads: As indicated on architectural Drawings or 5 lbf/sq. ft. minimum as required by the IBC.

2.2 FRAMING SYSTEMS

- A. Studs and Track: ASTM C645 .
1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection .
 2. Depth: As indicated on Drawings .
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- C. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness: As indicated on Drawings .
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings .
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Steel Thickness: As indicated on Drawings .
 2. Depth: As indicated on Drawings .
- G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
1. Configuration: hat shaped.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings .
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Shaped Furring Members:
1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Mold-resistant gypsum board.
4. Glass-mat, water-resistant backing board.
5. Cementitious backer units.
6. Water-resistant gypsum backing board.
7. Interior trim.
8. Joint treatment materials.
9. Laminating adhesive.

B. Samples for Initial Selection: For each type of trim accessory indicated.

1.3 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.
 - 1. Thickness: 1/2 inch.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- B. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: As indicated on Drawings .
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet .
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.
 - h. Base-of-Wall Galvanized Moisture Barrier Trim: Galvanized-steel sheet, 2 inches high.
 - i. Base-of-Wall PVC Moisture Barrier Trim: Extruded PVC, 1-3/4 inch high.

B. Exterior Trim: ASTM C1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc .
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings .
 - 2. Type X: Where required for fire-resistance-rated assembly .
 - 3. Mold-Resistant Type: As indicated on Drawings .
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying face layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 - 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws .

3.4 FINISHING OF GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints , rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated .
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.5 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095113 - 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 Project site .

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- C. Samples for Initial Selection: For components with factory-applied finishes.
- D. 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 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 - 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.

1.7 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.

1.8 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. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .
- B. 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 according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

- A. 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.
- B. Classification: Provide panels as follows:
 - 1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with glass-fiber cloth overlay.
 - 2. Pattern: E (lightly textured) .
- C. Color: White .
- D. Light Reflectance (LR): Not less than 0.85 .
- E. Ceiling Attenuation Class (CAC): Not less than 35 .
- F. Noise Reduction Coefficient (NRC): Not less than 0.80 .

- G. Articulation Class (AC): Not less than 190 .
- H. Edge/Joint Detail: Square Flush reveal sized to fit flange of exposed suspension-system members Beveled, kerfed, and rabbeted long edges and square, butt-on short edges .
- I. Thickness: As indicated in a schedule .
- J. Modular Size: As indicated on Drawings .
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

- A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
 - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.
 - 1. Structural Classification: Intermediate -duty system.
 - 2. End Condition of Cross Runners: butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Cold-rolled steel .
 - 5. Cap Finish: Painted white .

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
- E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member .
 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.
1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet , non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet , non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 099123 - INTERIOR PAINTING

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. Primers.
- 2. Water-based finish coatings.
- 3. Solvent-based finish coatings.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
- 2. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

- 1. Include preparation requirements and application instructions.
- 2. Indicate VOC content.

- B. Samples for Initial Selection: For each type of topcoat product.

1.4 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. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

- 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
- 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: As selected by Architect from manufacturer's full range .
 1. Ten percent of surface area will be painted with deep tones.

2.3 PRIMERS

- A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.
- B. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.
- C. Interior Alkyd Primer Sealer: Solvent-based, alkyd-type, primer/sealer for new interior wood, plaster, and porous surfaces,

2.4 WATER-BASED FINISH COATS

- A. Interior, Latex, Flat: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss and Sheen Level: Maximum gloss of five units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523 .
- B. Interior, Latex, Low Sheen: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss and Sheen Level: Maximum gloss of 10 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .
- C. Interior, Latex, Eggshell: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss and Sheen Level: Gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .
- D. Interior, Latex, Satin: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss and Sheen Level: Gloss of 20 to 35 units at 60 degrees and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523 .
- E. Interior, Latex, Semigloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .
- F. Interior, Latex, Gloss: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
 - 1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

2.5 SOLVENT-BASED FINISH COATS

- A. Interior, Alkyd, Eggshell: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.
 - 1. Gloss and Sheen Level: Gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523 .
- B. Interior, Alkyd, Semigloss: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.
 - 1. Gloss Level: Gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523 .
- C. Interior, Alkyd, Gloss: Pigmented, solvent-based alkyd paint for use on primed/sealed interior plaster, gypsum, wood, and metal walls primarily in residential and moderate traffic commercial environments.
 - 1. Gloss Level: Gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523 .

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 7/NACE No. 4.

- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Plastic conduit.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. .
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.

- d. Metal conduit.
 - e. Plastic conduit.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Other items as directed by Architect.
 - h. .
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 3. Allow empty paint cans to dry before disposal.
 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
1. High-Performance Architectural Latex System :
 - a. Block Filler: Interior/exterior latex block filler.
 - b. Prime Coat: Alkali-resistant, water-based primer.
 - c. Intermediate Coat: Matching topcoat.
 - d. Topcoat: Interior, latex, high-performance architectural coating, .
- B. Steel Substrates:
1. Alkyd System :
 - a. Prime Coat: .
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, alkyd, eggshell semigloss gloss.
 2. Alkyd over Surface-Tolerant Primer System :
 - a. Prime Coat: Surface-tolerant metal primer.
 - b. Intermediate Coat: Matching topcoat.

- c. Topcoat: Interior, alkyd, eggshell semigloss gloss.
- C. Galvanized-Metal Substrates:
 - 1. Alkyd over Cementitious Primer System :
 - a. Prime Coat: Cementitious galvanized primer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, alkyd, eggshell semigloss gloss.
- D. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 - 1. Alkyd System :
 - a. Prime Coat: Primer, .
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, alkyd, eggshell semigloss .
- E. Gypsum Board and Plaster Substrates:
 - 1. Latex over Latex Sealer System :
 - a. Prime Coat: Interior latex primer sealer.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, latex, flat low sheen eggshell satin semigloss gloss.
- F. Insulation-Covering Substrates: Including .

END OF SECTION 099123

SECTION 230009**MECHANICAL SELECTIVE DEMOLITION****PART 1 - GENERAL****1.01 DESCRIPTION OF WORK****A. Extent of Work**

Removal and demolition of selected items from selected areas of the building as indicated on the Drawings and as required to complete the Work.

1.02 SUBMITTALS

A. Submit a schedule indicating proposed methods and sequence of operations for selective removals and demolition Work, prior to commencement of operations. The sequence of operations shall be planned, in detail, to ensure uninterrupted progress of school sessions.

B. Submit details and procedures for dust and noise control.

C. Signed receipt for salvaged items delivered to the Owner.

D. Quality Control Submittals**1. Contractor Qualifications**

a. Provide proof of Contractor and Professional Engineer qualifications specified under "Quality Assurance".

b. Provide proof of Refrigerant Recovery Technician qualifications

E. Sustainability Submittals

1. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

2. Statement of the measures taken to reduce air with dust and particulate matter.

1.04 RESPONSIBILITY, PROTECTION, DAMAGES, RESTRICTIONS**A. Condition of Space**

The Owner assumes no responsibility for actual condition of the space in which removals and demolition Work is performed.

B. Protections

Provide temporary barricades and other forms of protection required to protect property, personnel, students and general public from injury due to selective removals and demolition work.

1. Provide protective measures as required to provide free and safe passage of students, school personnel, and the general public.
2. Protect from damage existing finish work that is to remain in place and which becomes exposed during operations.
3. Protect floors with building paper or other suitable covering.

C. Damages

Promptly repair any and all damages to all property and finishes caused by the removals and demolition work; to the Owner's satisfaction and at no extra cost to the Owner.

D. Explosives

The use of explosives is prohibited.

E. Power-driven Tools (for interior removals and demolition).

Only hand-held electric power-driven tools conforming to the following criteria shall be used to cut or drill concrete and masonry:

1. Electric Chiselling Hammer
 - a. Power Data 115 Volts AC
7-8 Amps
Three-wire grounded connection
 - b. Percussion 2400-2600 Impacts/Minute
 - c. Type/Size Hand-held (+ 18-inch length)
 - d. Unit Weight 12-15 pounds (minus chisel bit)
2. Electric Hammer Drill
 - a. Power Data 115 Volts AC
5-8 Amps
Three-wire grounded connection
 - b. Percussion 2400-3200 Impacts/Minute
 - c. Type/Size Hand-held (+ 18-inch length)

- d. Unit Weight 12-15 pounds (minus chisel bit)
- e. Speed Data 0-0500 RPM (Under load)

1.05 QUALITY ASSURANCE

A. Qualifications

- 1. Company specializing in performing the Work of this Section shall have a minimum of 3 years experience and shall have worked on 3 projects of similar size.
- 2. Preparation of details of shoring and bracing and underpinning shall be under the direct supervision of and bear the seal of a Licensed Professional Engineer of the State of New York experienced in the design of such work, who shall also be responsible for construction supervision of such.
- 3. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements

- 1. Work of this Section shall conform to all requirements of the NYS Building Code and all applicable regulations and guidelines of all governmental authorities having jurisdiction, including, but not limited to, safety, health, and anti-pollution regulations. Where more stringent requirements than those contained in the Building Code or other applicable regulations are given in this Section, the requirements of this Section shall govern.
- 2. Conform to the requirements of "Safety and Health Standards, Subpart P - Excavations, Trenching and Shoring" - OSHA.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to commencement of the selective removals and demolition Work, inspect the areas in which the Work will be performed. Determine and list the existing conditions of rooms or area surfaces and equipment. After the Work in each respective area is completed, determine if adjacent surfaces or equipment have been damaged as a result of the Work; if so, the damage shall be corrected at the Contractor's expense.

3.02 REMOVALS AND DEMOLITION WORK

- A. Perform selective demolition Work in a systematic manner and use such methods as are required to complete the Work indicated, and in accordance with the Specifications and governing City, State, and Federal regulations.

- B. When walls, partitions, floors, and ceilings (or portions thereof) are indicated to be removed; unless indicated otherwise:
 - 1. Remove all items attached to the surfaces of the construction to be removed.
 - 2. Remove all plumbing piping, fixtures, accessories and rough-in occurring on or in the construction to be removed; cap piping and/or re-route lines as indicated or required.
 - 3. Remove all connectors, piping, ductwork and other HVAC items and accessories occurring on or in the construction to be removed; cap and/or re-route piping and ductwork as indicated or required.
 - 4. Remove all electrical wiring, to include, but not limited to, lighting, communications, alarms and all related appurtenances, conduits, devices, fixtures, and other electrical items and accessories occurring on or in the construction to be removed; disconnect power and remove wiring and conduit back to source.
- C. Carefully remove items, equipment and materials to be retained by the Owner and deliver them to locations indicated in the Article titled "Ownership of Materials".

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish and other materials resulting from the removals and demolitions from the building immediately; transport and legally dispose of materials off-site. Disposal method shall be in accordance with City, State, and Federal regulations. Items to be retained by the Owner shall be delivered to locations indicated in the Article titled "Ownership of Materials".
- B. Burning of removed materials is not permitted on the job site.

3.04 CLEAN-UP AND REPAIR

- A. Upon completion of removals and demolition Work, remove tools, equipment and all remaining demolished materials from the site.
- B. Repair all damaged areas caused by the removals and demolition Work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. All areas in which Work was performed under this Section shall be left "broom-clean."

3.05 OWNERSHIP OF MATERIALS

- A. All equipment, materials, and items removed shall remain the property of the Owner, if desired; equipment, material and items not desired to be re-used or retained by the Owner shall be removed from the site by the Contractor. The Owner will designate which equipment, materials and items will be retained.

END OF SECTION

SECTION 230500**COMMON WORK RESULTS FOR HVAC****PART 1 - GENERAL****1.01 PRODUCT OPTIONS AND SUBSTITUTIONS**

- A. Refer to the Division 1 Sections for requirements in selecting products and requesting substitutions.

1.02 SCOPE OF WORK

- A. The following is a general listing of work items to be provided under this Contract. Work indicated is not necessarily all inclusive, nor shall it limit the extent of the work or exclude any work shown or specified and not listed.
- B. Work as indicated in the contract documents and as specified, including but not limited to the complete removal of material and equipment from the site.
- C. Furnish and install materials, equipment, and labor for a complete installation as specified in these contract documents.

1.03 PRODUCT LISTING

- A. Prepare a listing of major equipment and materials for the project. Submit this listing for approval.
- B. When two or more items of same material or equipment are required (pumps, valves, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings, sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in work, except as otherwise indicated.
- C. Provide products which are compatible within systems and other connected items.

1.04 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

- C. Coordinate deliveries of materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.06 DIMENSIONAL INFORMATION

- A. Dimensional information used for layout and locations shall be taken from architectural or structural drawings used by the construction trades.
- B. HVAC drawings are diagrammatic and have no dimensional significance. Do not scale. Locations of equipment and piping are to be as:
 - 1. Shown on the drawings;
 - 2. Directed in the field;
 - 3. Required for proper connection of equipment to be served;
 - 4. Required for proper symmetry in the space involved;
 - 5. With deviations made only with specific approval of Owner.
- C. Review the drawings of other trades and contractors, exchange shop drawings with them, cooperate in the preparation or prepare space layouts as required, to avoid conflicts and interferences with the installation of other trades in advanced stages of construction.
- D. Field verify all existing conditions and coordinate with other trades prior to fabrication and installation of equipment and material. Lack of field verification does not constitute a basis for additional monies during construction. Contractor assumes full responsibility for completeness of installation including coordination of work with other trades.
- E. Materials and equipment shall be shipped to the site knocked down to fit through existing building openings. Field verify the dimensions of existing openings and verify methods of delivery of materials and equipment prior to fabrication. Include in the bid price all costs associated with the disassembling and reassembling materials and equipment as required for delivery and installation.

1.07 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for materials and products.
- B. Record Drawings: At project closeout, submit record drawings of the installed work; in accordance with requirements of Division 1.

1.08 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance manuals for all equipment and materials specified herein.
- B. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
- C. Manufacturer's printed operating procedures to include start-up, break-in, routine and

normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions.

- D. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
- E. Servicing instructions and lubrication charts and schedules.

1.09 WARRANTIES

- A. Refer to Division 1 for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
- B. Compile and assemble the warranties into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND CLEARANCES

- A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- B. Maintain working space as required by NEC 110.26 for live electrical components as follows:
 - a. Width: 30"
 - b. Height: 6'-6" or height of equipment.
 - c. Depth:
 - i. 0-150V to ground: 3'-0"
 - ii. 151-600V to ground, insulated/ungrounded parts other side: 3'-0"
 - iii. 151-600V to ground, grounded parts other side: 3'-6"
 - iv. 151-600V to ground, live parts both sides: 4'-0"

3.02 INSTALLATIONS

- A. Coordinate equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases and openings in other building components to allow for installations.

- D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- E. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- F. Coordinate the cutting and patching of building components to accommodate the installation of equipment and materials.
- G. Where mounting heights are not detailed or dimensioned, install overhead and materials to provide the maximum headroom possible.
- H. Install equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- I. Coordinate the installation of materials and equipment above ceilings with suspension system, light fixtures, and other installations.
- J. Coordinate connection of systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations and controlling agencies. Provide required connection for each service.

3.03 CUTTING AND PATCHING

- A. This Article specifies the cutting and patching of equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.
- B. Refer to the Division 1 Sections for general requirements for cutting and patching.
- C. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, because of damage caused as a result of the installations.
- E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of equipment and materials required to:
 - 1. Uncover work to provide for installation of ill-timed work;
 - 2. Remove and replace defective work;
 - 3. Remove and replace work not conforming to requirements of the contract documents;
 - 4. Remove samples of installed work as specified for testing;
 - 5. Install equipment and materials in existing structures;
 - 6. Upon written instructions from the Owner, uncover and restore work to provide for the Owner's observation of concealed work.
- G. Cut, remove and legally dispose of selected equipment, components, and materials as

indicated, including, but not limited to removal of piping, valves, trim, and other items made obsolete by the new work.

- H. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- I. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- J. Locate, identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

END OF SECTION 230500

SECTION 230523**VALVES****PART 1 GENERAL****1.01 ABBREVIATIONS**

- A. IBBM: Iron body, bronze mounted.
- B. OS&Y: Outside screw and yoke.
- C. WOG: Water, oil, gas.
- D. WSP: Working steam pressure.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each valve type.
- B. Valve Schedule: List type of valve, manufacturer's model number, and size for each service application.
- C. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.04 MAINTENANCE

- A. Special Tools:
 - 1. One wrench for each type and size wrench operated plug valve.

PART 2 PRODUCTS**2.01 VALVES - GENERAL**

- A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
- B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
- C. Valve parts of same manufacturer, size and type shall be interchangeable.
- D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.

- E. Manually operated valves shall open in a counterclockwise direction by means of round ventilated type handwheels.
 - 1. Exception: Cross handle type handwheels are acceptable for valves up to 3 inches in size.
- F. In open position, wedge and stem of gate valves shall clear the waterway completely.
- G. Valves which use packing shall be capable of being packed when wide open and under full working pressure.
- H. Size valves the same size as the piping in which they are installed, unless otherwise specified.
- I. Provide manually operated gate and globe valves 8 inches in size and larger with valved by-pass incorporated in body of main valve when installed in piping systems operating at a pressure in excess of 125 psig WSP and as shown on the drawings. Service rating of by-pass valve shall be equal to or greater than main valve it is by-passing.
 - 1. Exception: Stop-check valves.

2.02 MATERIALS

- A. Body:
 - 1. Cast Iron: ASTM A 126 66, Class B, higher strength cast iron.
 - 2. Bronze: For use up to 150 psig WSP, ASTM B 62 and over 150 psig to 300 psig WSP, ASTM B 61.
 - 3. Cast Steel: ASTM A 216 Grade WCB.
 - 4. Forged Steel: ASTM A 105 Grade 2.
- B. Stem:
 - 1. Cast Manganese Bronze: ASTM B 584.
 - 2. Cast Silicon Brass: ASTM B 584.
 - 3. Rolled Silicon Brass: ASTM B 98 Alloy D.
 - 4. Rolled Aluminum Bronze: ASTM B 150 Alloy 1.
 - 5. Rolled Manganese Bronze: ASTM B 138 Alloy A (half hard).
 - 6. Naval Brass: ASTM B 21 Alloy A or Alloy C (hard).
 - 7. Carbon Steel: As specified for particular type of valve.
 - 8. Stainless Steel: As specified for particular type of valve.
- C. Trim: As specified for particular type of valve.

2.03 GATE VALVES

- A. Type A: 125 psig WSP, 200 psig WOG, bronze body, union bonnet, solid wedge disc, and threaded ends. Acceptable Valves: Crane 428UB, Hammond IB617, Jenkins 47CU, Milwaukee 1152, Nibco T134, and Stockham B105.
- B. Type C: 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2

& 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170, and Stockham G620 & G623

- C. Type D: 125 psig WSP, 200 psig WOG, bronze body, threaded bonnet, solid wedge disc, and solder ends. Acceptable Valves: Crane 1330, Hammond IB635, Jenkins 991AJ, Milwaukee 149, Nibco S111, and Stockham B108.
- D. Type E: 200 psig WSP, 400 psig WOG, bronze body, union or bolted bonnet, solid wedge disc, with monel, cupro-nickel alloy or stainless steel seat rings, and threaded ends. Acceptable Valves: Crane 424, Hammond IB650, Jenkins 2270UJ, Milwaukee 1174, Nibco T174SS, and Stockham B132.
- E. Type G: 300 psig WSP, 600 psig WOG, bronze body, union or bolted bonnet, solid wedge disc, cupro-nickel alloy or stainless steel seat rings, and threaded ends. Acceptable Valves: Crane 634E, Hammond IB658, Jenkins 2280UJ, Milwaukee 1184, Nibco T174SS, and Stockham B145.

2.04 GLOBE AND ANGLE VALVES

- A. Type J: 125 WSP, 200 psig WOG, bronze body, threaded bonnet, and threaded ends. Acceptable Valves: Crane 1, Hammond IB440 & IB463, Jenkins 101J, Milwaukee 502, Nibco T211 & T311, and Stockham B16.
- B. Type K: 125 psig WSP, 200 psig WOG, IBBM OS&Y, bolted bonnet, and threaded or flanged ends depending on size. Acceptable Valves: Crane 351 & 353, Hammond IR116, Jenkins 613C & 615C, Milwaukee F2981, Nibco F718B & F818B, and Stockham G512, & G515.
- C. Type M: 250 psig WSP, 500 psig WOG, IBBM OS&Y, bolted bonnet, renewable seat and disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 21E, Hammond IR313, Jenkins 923C, Milwaukee F2983, Nibco F768B & F869B, and Stockham F532.
- D. Type N: 300 psig WSP, 600 psig WOG, bronze body, union bonnet, with 500 Brinell hardness stainless steel renewable plug, 500 Brinell hardness stainless steel replaceable seat ring, and threaded or flanged ends depending on size. Acceptable Valves: Crane 382P & 384P, Hammond IB444, Jenkins 556P & 558P, Milwaukee 593A, Nibco T276AP & T376AP, and Stockham B74 & B274.
- E. Type O: 125 psig, 200 psig WOG, bronze body, threaded bonnet, and solder ends. Acceptable Valves: Crane 1310, Hammond IB423, Jenkins 1200C, Milwaukee 1502, Nibco S211, and Stockham B17.

2.05 CHECK VALVES

- A. Type S: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 37, Hammond IB940, Jenkins 4092, Milwaukee 509, Nibco T413Y, and Stockham B319Y.

- B. Type T: 150 psig WSP, 300 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with Buna-N or teflon. Acceptable Valves: Crane 137, Hammond IB944, Jenkins 4092 & 4037J, Nibco T4331, and Stockham B321.
- C. Type U: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and solder ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 1340, Hammond IB912, Jenkins 4093, Milwaukee 1509, Nibco S413Y, and Stockham 309Y.
- D. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.
- E. Type W:
 - 1. Globe Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
 - a. Acceptable Valves (125 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 20D, Hammond IR9354, Milwaukee 1800, Nibco F910, and Williams Hager 636.
 - b. Acceptable Valves (250 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 21D, Milwaukee 1800, Nibco F960, and Williams Hager 636.
 - 2. Wafer Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
 - a. Acceptable Valves (125 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 10D, Hammond IR9253, Milwaukee 1400, Nibco W910, and Williams Hager 329 & 375.
 - b. Acceptable Valves (250 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 11D, Milwaukee 1400, Nibco W960, and Williams Hager 329 & 375.
- F. Type X: 300 WSP, 600 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face disc for cold water service with Buna-N or teflon. Acceptable Valves: Crane 76E, Hammond IB949, Jenkins 4962J, Milwaukee 507, Nibco T4731, and Stockham B375.
- G. Type Y: 250 psig WSP, 500 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 39E, Hammond IR322, Jenkins 339C, Milwaukee F2970, Nibco F968B, and Stockham F947.
- H. Type Z: 125 psig flange pressure rating, cast iron body, wafer style, split clapper plate type with integral body seat ring, plain or flat face end connections, resilient Buna-N seal vulcanized to body seat ring; aluminum, bronze or stainless steel

clapper plates; Type 316 stainless steel clapper springs and hinge pins; and nickel plated steel or stainless steel stop pieces. Acceptable Valves: Apco Series 9000, Nibco W920W, Stockham WG970, and Marlin Duo-Check II.

2.06 PLUG VALVES

- A. Type AA: 200 psig WOG, lubricated type with standard port opening, cast iron or semi-steel body, sealed lubrication system with lubricant fitting and dial indicator, cylindrical plug or teflon tapered plug, lubricant grooves in body or plug, threaded or flanged ends depending on size, and capable of lubrication with valve under pressure and plug in any position.
 - 1. Acceptable Valves:
 - a. 1/2 inch to 3 inch size: Homestead 611 & 612, Resun R1430 & R1431, and Rockwell 142 & 143.
 - b. 4 inch size: Homestead 611 & 612, , Resun R1430 & R1431, and Rockwell 142 & 143.
 - c. 5 inch size: Homestead 611 & 612, Resun R1431, and Rockwell 143.
 - d. 6 inch size: Homestead 611 & 612, , Resun R1431, and Rockwell 143.
 - e. 8, 10 & 12 inch sizes: Homestead 612G, Resun R1431WGA, and Rockwell 149.
 - 2. Operators:
 - a. 6 inch size and Less: Wrench operator.
 - b. 8 inch size and Up: Worm gear operator.
- B. Type AB: 100 psig WOG, gas cock type with cast iron or bronze body, bronze plug, square head, wrench operator, and threaded ends. Acceptable Manufacturers: Crane, Eclipse Combustion, and McDonald.

2.07 BUTTERFLY VALVES

- A. Type BF: Iron body, flangeless wafer or lugged type, (lug for each bolt hole, drilled and tapped for cap screws), with replaceable reinforced resilient EPT (EPDM) seats, bronze or nickel plated ductile iron discs, phosphate coated steel or stainless steel stems, and raised necks able to accommodate 2 inches of insulation. Acceptable Manufacturers: Crane, Demco, De Zurik, Hammond, Keystone, Milwaukee, Nibco, Stockham, and Watts.
 - 1. Pressure Ratings:
 - a. 12 inch size and Less: 200 psig WOG at 275 degrees F.
 - b. 14 inch size and Up: 150 psig WOG at 275 degrees F.
- B. Type BF-HP: ANSI Class 150 lug style carbon steel body, stainless steel disc and stem, RTFE seats and bushings. Acceptable Manufacturers: Crane, Hammond, Keystone, Milwaukee, and Stockham.
- C. Operators:
 - 1. 6 inch size and Less: Manual actuator handles with external indication of disc position, and suitable means of locking actuator in any fixed position.
 - 2. 8 inch size and Up: Worm gear operator.

2.08 COMBINATION BALANCING AND SHUT-OFF VALVES

- A. Heavy duty brass construction of angle or straightway pattern with 200 psig working water pressure at 250 degrees F, one union connection and one threaded or solder end, visible graduated dial indicator, memory stop, and wheel handle with full turn opening. Acceptable Manufacturers: Dunham-Bush, and Spirax Sarco.

2.09 REFRIGERANT VALVES

- A. Type BVR Refrigerant ball valve: Full port, hermetically welded, forged brass with copper tube extensions intended for use with refrigerants specified, teflon seats, polished brass ball, teflon seals, and flared or brazed ends. 500 psig CWP, UL listed. Provide with access fitting. Acceptable Manufacturers: Mitsubishi, Daikin, Apollo 79 series, or equal.

2.11 WATER PRESSURE REDUCING VALVES

- A. Cold Water Make-Up Service:
 - 1. Adjustable direct acting, spring loaded, diaphragm operated, single seat type conforming to ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Supply Systems. Acceptable Manufacturers: Bell & Gossett, Watts, and Wilkins.
 - a. Body: Brass or bronze construction.
 - b. Wetted Parts: Brass, bronze, stainless steel, or nickel alloy construction.
 - c. Renewable seat and removable composition disc.
 - d. Integral low inlet pressure check valve.
 - e. Operating Temperature Range: 33-160 degrees F.
 - f. Maximum Working Pressure: 125 psi.
 - 2. Pressure reducing valves with integral strainers may be substituted for approval, in lieu of separate valve and strainer, if integral strainer and valve meet individual valve and strainer specifications.

2.13 SAFETY AND RELIEF VALVES

- A. General Requirements: Valves shall be as specified by ASME Code governing manufacture of such valves within scope of their particular usage, i.e., Heating Boilers, Power Boilers, Unfired Pressure Vessels, etc., shall be tested, rated and listed by National Board of Boiler and Pressure Vessel Inspections and shall bear symbol of ASME and NBB and PVI, unless otherwise specified. Liquid relief valves do not require ASME tagging or marking, or NBB and PVI Certification. Valves for applications specified shall conform to the ASME Code, Section IV, Heating Boilers and the following:
 - 1. Valves for Steam Heating Boilers: (Operating at 16 psig and above) shall be sized in accordance with ASME Boiler Code and the State of New York Department of Labor Code, shall be ASME Standard, ASME tested, and NBB & PVI certified and marked in accordance with ASME requirements. Valve body and yoke shall be cast steel ASTM A 216

- Grade WCB and stem, disc, seat bushing or nozzle, adjusting ring, compression screw and other trim parts shall be stainless steel or equivalent material as approved by State. Valves shall have flanged inlet and outlet connections, with inlet connection being 300 lb. class.
2. Valves for steam heating boilers operating at a maximum pressure of 15 psig shall have a maximum pressure setting of 15 psig. Sizing of valves shall be in accordance with ASME Table HG 400.1. Valve bodies shall be bronze or cast iron, with discs and seats of bronze.
 3. Valves for hot water heating boilers shall conform to the requirements of the ASME Code and have a maximum pressure setting of 30 psig. Valves shall be of Safety Relief type, i.e., shall lift slowly to relieve normal thermal pressure build-up and “pop” to relieve excessive pressure due to “runaway” conditions, caused by the failure of any pressure control device and shut-down firing mechanism on excessive pressure indication. Valve bodies shall be bronze or cast iron, with non-vulcanizing synthetic discs and with seats of bronze.
 4. Valves for direct fired domestic hot water boilers shall conform to requirements of ASME Code, Section IV, Paragraph HG 400.2 (a). Valves shall be of temperature-pressure type, rated at 125 psig test pressure. Thermostatic element shall, on rising temperature, cause the valve to open at 188 degrees F. and valve shall deliver its rated capacity at 208 degrees F. and close drip tight at 183 degrees F. Valves for use on gas fired heaters shall be AGA approved and shall be so stamped or marked.
 5. Valves for combination domestic hot water heater and storage tanks shall conform to the requirements of ASME Code, Section IV and USA Standard Z21.22 and shall be NBB listed. Valves shall be of the temperature - pressure type. Thermostatic element shall, on rising temperature, cause the valve to open at 200 degrees F. and valve shall deliver its rated capacity at 210 degrees F. and close drip tight at 195 degrees F. Valves shall be sized in accordance with Unfired Vessel Code.
 6. Valves for Unfired Pressure Vessels: Safety and safety relief valves on secondary side of unfired pressure tanks, water heaters and heat exchangers shall comply with Code requirements governing applicable equipment as outlined in ASME Code, Section IV, Article 4, Paragraph HG 400.3 and as follows: Secondary side of heat exchanger shall be protected by officially rated valves, set for same pressure or temperature as heretofore specified, when secondary side furnishes steam or hot water for purpose equivalent to purposes for which a boiler would be installed; valves for this purpose shall be sized in accordance with Unfired Vessel Code.
 7. Relief Valves For Use On The Discharge Side of Steam Pressure Reducing Valve Stations:
 - a. When pressure reducing valve station is set to deliver steam at a pressure not to exceed 10 psig, safety relief valves shall comply with the requirements of the ASME Low Pressure Boiler Code, Section 4, Article 4 and shall be sized to relief all steam that reducing valve or by-pass valve can deliver when in a wide-open position, without permitting pressure to rise above 20 psig.

- b. When pressure reducing valve station is set to deliver steam at a pressure in excess of 10 psig, safety relief valves shall be manufactured in accordance with the ASME Power Code, Section 1, but may be sized in accordance with the Unfired Pressure Vessel Code. Valves shall relieve all steam the pressure reducing valve or by-pass valve can deliver, without permitting pressure to rise more than 10 percent above the maximum allowable working pressure.
- 8. End Connections: Unless otherwise specified, safety valves, relief valves and safety relief valves, in sizes 3/4 inch to 3 inches IPS inclusive, may be furnished with male or female pipe thread inlet and female pipe thread outlet; valves over 3 inches IPS must be furnished with 125 lb. or 250 lb. flanged inlet and may be equipped with female threaded or 125 lb. flanged outlet.

2.14 NEEDLE STOP VALVES

- A. For Temperatures to 300 degrees F.: All brass or forged carbon steel construction, union bonnet, screwed ends, built for 1000 psi at 300 degrees F.
- B. Acceptable Manufacturers: Marsh Instrument Company, Singer-American Meter Division, H.O. Trerice Co. and Weksler Instruments Corp.

2.15 GAGE COCKS

- A. Gage Cocks: All brass construction, "T" or lever handles, screwed ends, built for 300 psig hydraulic pressure. Acceptable Manufacturers: Marsh Instrument Company, Mueller Instruments Co., H.O. Trerice Co. and Weksler Instruments Corp.

2.16 GROOVED END VALVES

- A. Valves shall be of type, material and pressure rating, as required by the particular application, as approved.

2.17 VACUUM RELIEF VALVES

- A. For Use With Steam:
 - 1. Up to 15 psig: ITT Hoffman No. 62, and Watts Regulator Co. No. N36.
 - 2. 16 psig to 150 psig: ITT Hoffman No. 62.
- B. For Use With Water: Watts Regulator Co. No. N36.

2.18 BALL VALVES

- A. Type BV: 150 psig WSP, 600 psig WOG, 2-piece full port, bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips and threaded, solder, or press-fit ends. Acceptable Manufacturers: Apollo, Hammond, Milwaukee, Nibco, and Watts.

1. Valve Option: Extended Stem.
2. Ball Valves for Press-fit Copper Fittings shall be two-piece bronze or brass body with full port, chrome or brass plated ball, blow-out proof stem and PTFE or RTFE seats, rated at 250 psi minimum with press fitting ends. Ball Valves shall be Viega Model 2970.10, NIBCO PC585-70; Apollo Valves 77W-140 Series or Jomar Valve JP-100. Ball valves shall have a metal lever handle.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install valves at locations noted on the drawings or specified. In addition, comply with the following requirements:
 1. Install valves where required for proper operation of piping and equipment including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
 2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Non-rising stem valves shall be used only where headroom prevents full extension of rising stems. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
 3. Install gate valves for shut-off; to isolate equipment, parts of systems, and vertical risers and any banked system of coils and to separate each coil.
 4. Hose gate valves: Provide hose gate valves to drain the pipe at the low points of the system.
 5. Install globe for throttling service and control device.
 6. Provide 1" gate vent valves at all high points in the piping system.
 7. Provide lift check valves at the discharge of all pumps as shown on the Drawings.
 8. Outside Screw and Yoke Type: Gate valves in lines leading from the boilers to the boiler steam header, in boiler blow-off lines, and at other points so specified or shown on the drawings shall have outside screw and yoke (OS&Y) with bronze rising stem.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

- C. Mechanical Actuators: Install mechanical actuators with chain operators where indicated on the drawings and wherever valves are installed more than 8'-0" above the floor (except for valves concealed above ceilings). Extend chains to about 5'-6" above the floor and hook to clips to clear aisle passage or provide chain buckets (Babbitt Bucket or equal).
- D. Shutoff valves shall be installed on the supply and return side of all heat exchangers.
- E. Shutoff valves shall be installed on the building supply and return of central utility systems and district heating and cooling systems.
- F. Shutoff valves shall be installed on the connection to any pressure vessel.
- G. Shutoff valves shall be installed on both sides of a pressure-reducing valve.
- H. Shutoff valves shall be installed on connections to mechanical equipment and appliances.

3.04 DISCHARGE PIPING FROM LIQUID RELIEF VALVES

- A. Connection vent piping to the discharge outlet of all relief valves and terminate over floor drain, bell outlet or other approved point of waste.

3.05 VALVE APPLICATION SCHEDULE

- A. Schedule of valve applications for the different services is as follows:
 - 1. Boiler Trim, 300 psig and less, 2 inches and less: Screwed end, GV-7 gates and AV-7 globe or angles.
 - 2. Boiler Stop Check, 300 psig and less: Flanged end, SC-1 angles.
 - 3. Boiler Header Stop, 300 psig and less: Flanged end, AV-4 globe or angles.
 - 4. Chemical Feed at Boiler (CMF), 300 psig and less, 2 inches and less: Screwed end, GV-7 gates, AV-7 globe or angles and CV-19 checks.
 - 5. Chemical Feed, at Chemical Tank and Pump (CMF), 300 psig and less, 2 inches and less: Screwed end, D gates, J globe or angles and X checks.
 - 6. Chemical Feed (CMF) 125 psig and less:
 - a. 3 inches and Less: Screwed or solder ends, A or D gates, J or O globe or angles and S or U checks.
 - b. 5 inches and Up: Flanged end, C gates, K globe or angles and V checks.
 - 7. Chilled Water (CWS & CWR) 125 psig and less:
 - a. 3 inches and Less: Screwed, solder, or press-fit ends, A or D gates or BV balls, J or O globe or angles and S or U checks.
 - b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and V checks.
 - 8. Chilled Water (CWS & CWR) 126 to 250 psig: Flanged end, F or G gates or BF-HP butterflies, M globe or angles and X or Y checks.
 - 9. Cold Water in Buildings (CW) 125 psig and less:

- a. 3 inches and Less: Solder end, D gates or BV or BVP balls, O globe or angles and U checks, or flanged end, C gates, K globe or angles and V checks, with solder joint companion flanges.
 - b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and V checks.
10. Gas - Natural, Manufactured or Mixed Fuel (G) 125 psig and less:
- a. 2 inches and Less: Screwed end, AB plug valves.
 - b. 2-1/2 inches and Up: Flanged end, AA plug valves.
11. Gas, Underground (G): Dresser end, AA plug valves.
12. High Temperature Water (HTS & HTR) 300 psig and less: Weld end, GV-8 gates, AV-8 globe or angles and CV-21 checks.
13. Hot Water (HWS & HWR) 125 psig and less:
- a. 3 inches and Less: Screwed, solder, or press-fit ends, A or D gates or BV balls, J or O globe or angles and S or U checks.
 - b. 4 inches and Up: Flanged end, C gates or BF butterflies, K globe or angles and S checks.
14. Hot Water (HWS & HWR) 126 to 250 psig: Flanged end, F or G gates or BF-HP butterflies, M globe or angles and X or Y checks.
15. Refrigerants - 700 psig and less, Up to 3 1/8 inches O.D.: Brazed or flared end BVR ball valve.

END OF SECTION

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SECTION 230529**PIPE HANGERS AND SUPPORTS****PART 1 - GENERAL****1.01 SUBMITTALS**

- A. Shop Drawings:
1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
 2. Details of pipe anchors.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

PART 2 - PRODUCTS**2.01 PIPE HANGERS AND SUPPORTS**

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
UP to 2-1/2	4	16	6	10
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

- C. Pipe covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.

PIPE SIZE (Inches)	SADDLE LENGTH (Inches)	SADDLE GAGE
8" and up	12"	7 (3/16")

- D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches IPS and larger.
1. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.
- E. Adjustable Floor Rests and Base Flanges: Steel
- F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.
- G. Riser Clamps: Malleable iron or steel.
- H. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, 2-1/2 to 20 inches, from single rod if horizontal movement caused by expansion and contraction might occur.
- I. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, 2 to 30 inches, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction
- J. Restraints, Anchors, and Supports for Grooved End Piping Systems: As recommended by the grooved end fitting manufacturer.
- K. Foam Insulated Pipe Hanger: Single-piece thermally insulated pipe hanger with self-adhesive closure. CFC-free PET load-bearing segments embedded in closed cell insulation with outer shell of 30-mil thick painted aluminum.

2.02 FASTENERS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN1405, HN-1614, FS-1411 Series
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS-3822.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips Series S-14.
- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.
- E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS-38 Series.
- F. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 800 lbs/ft: Kindorf's D-986.
 - 2. Load Rating 1500 lbs/ft: Kindorf's D-980.
 - 3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
 - 4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.
- G. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch dia machine bolts.
- H. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch dia bolts having special wedge shaped heads.
- I. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.03 SHOP PAINTING AND PLATING

- A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with zinc chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.
- B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 - EXECUTION

3.01 PREPARATORY WORK

- A. Place inserts into construction form work expeditiously, so as not to delay the work.

3.02 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
- B. Support all insulated horizontal piping by means of hangers or supports with insulation shields installed outside of the insulation.
- C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.

- 1. For Steel, Alloy Steel, and Fibrous glass Reinforced Plastic Pipe (FRP):

Pipe Size (Inches)	Maximum Spacing (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and over	12

- 2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
3/4 and under	5
1-1/4	6
1-1/2 and over	8

- 3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
 - 4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
 - 5. For Branch Piping Runs and Runouts over 5 Feet in Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
 - 6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
- D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	Pipe	Tubing	Pipe	Tubing
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

- Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

- Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 10 feet on copper pipe and 15 feet on steel pipe, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
- Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

- F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

3.03 UPPER HANGER ATTACHMENTS

A. General:

- Do not use drive-on beam clamps.
- Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
- Do not drill holes in main structural steel members.
- "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.

- B. Attachment to Steel Frame Construction: Provide intermediate structural steel members

where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.
 2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
 3. Do not drill holes in main structural steel members.
 4. "C" clamp type of upper hanger attachments with restraining straps may be used as upper hanger attachments for the support of piping up to a maximum of 3 inches in size and a temperature from 50 degrees F to 200 degrees F.
- C. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more): Where necessary, attach hangers to the deck with welding studs (except at roof decks), thru-bolts with fish plates or tee hangers. Do not support a load, in excess of 250 lbs from any single welded stud.
- D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.
- E. Attachment to Existing Cast-In-Place Concrete:
1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
 2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.
- F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Secure attachments to structural steel wherever possible. When fill is applied over decks, thru-bolts and fish plates may be used to support piping up to a maximum of 4 inches in size; mechanically expanded rod hangers or toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.
- G. Attachment to Hollow Block or Tile Filled Concrete Decks: Secure hangers to structural steel wherever possible. Inserts may also be used by omitting a block and pouring a solid concrete block, with a cast-in-place insert where required.
- H. Attachment to Waffle Type Concrete Decks: Provide cast-in-place inserts where required. When fill is applied over deck, thru-bolts and fish plates may be used.
- I. Attachment to Precast Concrete Tee Construction:
1. Secure hangers to tees by any of the following methods:
 - a. Tee hanger inserts between adjacent flanges.
 - b. Thru-bolts and fish plates, except at roof deck without concrete fill.
 - c. Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
 2. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
 3. Do not use powder driven fasteners.

3.04 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

- A. Install pipe anchors, restraints and sway braces, at locations noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, away from anchor points. Install anchors independent of all hangers and supports, and in a manner which will not affect the structural integrity of the building.

3.05 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.06 PIPE SUPPORT FOR SYSTEMS INSULATED WITH FLEXIBLE ELASTOMERIC FOAM

- A. Install a single-piece thermally insulated pipe hanger with self-adhesive closure at all points of support for piping or tubing to be insulated for cold and hot service insulated piping. Direct hanger or clamp contact of pipe for hot or cold piping is not allowed.

3.07 PIPE INSULATION SHIELDS

- A. Install a pipe insulation shield (unless provided with a combination clevis hanger as described above) at all points of support, for cold and hot service insulated piping. Direct hanger contact of pipe for hot or cold piping is not allowed. Center shields on all hangers and supports, and install in such a manner so as not to cut, puncture or compress insulation.

3.08 PIPE COVERING PROTECTION SADDLES

- A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

END OF SECTION 230529

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SECTION 230549

CONCRETE PADS FOR EQUIPMENT

PART 1 - GENERAL

1.01 REFERENCES

- A. Except where shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-84 of the American Concrete Institute.

1.02 STORAGE

- A. Store materials as required to insure the preservation of their quality and fitness for the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Anchor Bolts: Standard Bolts, ASTM A 307, with lock washers and nuts.
- B. Steel Plates: ASTM A 36.
- C. Sleeves: Steel Pipe, Schedule 40, black, ASTM A 53.
- D. Steel Shims and Fillers: ASTM A 569.
- E. Reinforcement: Furnish the following unless otherwise indicated on the Drawings:
 - 1. Fabric Reinforcement: ASTM A 185 welded wire fabric, 6 x 6 - W2.9 x W2.9 fabricated into flat sheets unless otherwise indicated.
 - 2. Bar Reinforcement: ASTM A 615, grade 60, deformed.
 - 3. Metal Bar Supports: AISI Type 430 stainless steel or plastic.
 - 4. Tie Wire: Black annealed wire, 16 gage minimum.
- F. Bonding Agent (Adhesive): Epoxy-resin-base bonding system, Type II, complying with ASTM C 881. Grade and class as required by conditions of use.
- G. Cement Grout: Portland cement and clean natural sand mixed at a ratio of 1.0 part cement to 3.0 parts sand, with only the minimum amount of water required for placement and hydration.
- H. Dowels: #4 size rebar ASTM A 615 Grade 60 deformed, grouted solid with HILTI HY-200 adhesive system. Embed 2-¾" and install per manufactures specifications.

2.02 PROPORTIONING OF CONCRETE MIXES

- A. Compressive Strength: Minimum 3000 psi.

- B. Weight: Normal.
- C. For outdoor installations: Concrete shall be air-entrained. Design air content shall be 6 percent by volume, with an allowable tolerance of ± 1.5 percent for total air content. Entrained air shall be provided by use of an acceptable air-entrained admixture. Air-entrained cement shall not use used.
- D. Slump: Between 2 inches and 4 inches.
- E. Admixtures: Do not use admixtures in concrete unless specified or acceptable in writing by the Engineer.
- F. Selection of Proportions: Concrete proportions shall be established on the basis of previous field experience or laboratory trial batches, unless otherwise acceptable in writing by the Engineer. Proportion mix with minimum cement content of 564 pounds per cubic yard for 3000 psi concrete.

2.03 FABRICATION OF ANCHOR BOLT ASSEMBLIES

- A. Bolts: Diameter 1/8" less than the bolt holes in the equipment supports and length equal to the depth of the pad minus 1 inch plus the additional length required to provide full thread through nuts after shims, equipment and washers are in place.
- B. Sleeves: Diameter 1/2" larger than the bolt diameter and length as required to extend from the head of the bolt to the top of the pad.
- C. Plates: 3 x 3 x 1/4" steel plate.
- D. Weld a plate to the head end of a bolt. Center the bolt in a sleeve and tack weld the sleeve to the plate.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. For outdoor installations: Concrete materials, reinforcement and forms which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.
- B. Concrete pads shall be coordinated with equipment provided and shall be 4" high and 6" longer and wider than equipment supported unless otherwise noted.

3.02 BONDING TO EXISTING CONCRETE SLAB

- A. Where more than one pad is required for a single piece of equipment, install 4 dowels in existing slab for each pad. Drill existing slab as required to install dowels 2-3/4" inches into the existing concrete. Grout dowels in the drilled holes.
- B. Prior to placing concrete, thoroughly clean the existing concrete slab. Allow existing concrete to dry and apply bonding agent (adhesive) over the existing concrete in accordance with manufacturers printed instructions.

3.03 INSTALLING ANCHOR BOLTS AND SLEEVES

- A. Install anchor bolts (with sleeves) for all bolt holes in equipment supports.
- B. Accurately position and securely support anchor bolts and sleeves prior to placing concrete. Support head of bolt one inch above bottom of pad. Temporarily close open end of sleeves to prevent entry of concrete.
- C. Grout anchor bolts in sleeves with cement grout or acceptable shrink-resistant grout after final positioning.

3.04 REINFORCING

- A. Except where other reinforcement is shown on the Drawings, install welded wire fabric at a depth of 2" in each pad, extending to within two inches from perimeter of pad.

3.05 FINISHES

- A. Formed Surfaces: Provide a smooth form finish, with rounded or chamfered external corners, on all concrete surfaces exposed to view.
- B. Unformed Surfaces: Provide a troweled finish on top surface of pads.

END OF SECTION 230549

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SECTION 230550**VIBRATION ISOLATION****PART 1 - GENERAL****1.01 DESCRIPTION**

- A. Furnish and install vibration control devices, materials, and related items. Perform all work as shown on the drawings and as specified herein to provide complete vibration isolation systems in proper working order.

1.02 SUBMITTALS

- A. Refer to related sections elsewhere for procedural instructions for submittals.
- B. Before ordering any products, submit shop drawings of the items listed below. The shop drawings must be complete when submitted and must be presented in a clear, easily understood form. Incomplete or unclear presentation of shop drawings may be reason for rejection of the submittal.
1. A complete description of products to be supplied, including product data, dimensions, specifications, and installation instructions.
 2. Detailed selection data for each vibration isolator supporting equipment, including:
 - a. The equipment identification mark;
 - b. The isolator type;
 - c. The actual load;
 - d. The static deflection expected under the actual load;
 - e. The specified minimum static deflection.
 3. Steel rails, steel base frames, and concrete inertia bases showing all steel work, reinforcing, vibration isolator mounting attachment method, and location of equipment attachment bolts.
 4. Special details necessary to convey complete understanding of the work to be performed.

1.03 MATERIAL AND EQUIPMENT

- A. All vibration isolation mounts shall be supplied by one of the following acceptable manufacturers:
- | | |
|--|--------|
| Amber/Booth Co. (Houston, TX)..... | A.B. |
| AVNEC Incorporated (Floral Park, NY) | CA.I. |
| Mason Industries Inc. (Hauppaughe, NY) | M.I. |
| Kinetics Noise Control Inc. (Dublin, OH)..... | K.N.C. |
| Vibration Mountings & Controls Inc. (Butler, NJ) | V.M.C. |
- B. Unless otherwise specified, supply only new equipment, parts and materials.
- C. Substitutions of equal equipment beyond the alternatives listed will be permitted only with the written permission of the Engineer. Accompany each request for acceptance of

substitute equipment with manufacturer's certified data proving the equivalence of the proposed substitute in quality and performance. The Engineer shall be the final judge of the validity of the data submitted.

1.04 REQUESTS FOR CHANGE

- A. Any requests for changes to the specifications must be submitted in writing at least ten days prior to bid closing. Approval will be given through a written addendum.

1.05 QUALITY ASSURANCE

- A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with other trades. Coordinate plan dimensions with size of housekeeping pads.
- B. Provide vibration isolators of the appropriate sizes, with the proper loading to meet the specified deflection requirements.
- C. Supply and install any incidental materials such as mounting brackets, attachments and other accessories as may be needed to meet the requirements stated herein, even if not expressly specified or shown on the drawings, without claim for additional payment.
- D. Verify correctness of equipment model numbers and conformance of each component with manufacturer's specifications.
- E. Should any rotating equipment cause excessive noise or vibration when properly installed on the specified isolators, the Contractor shall be responsible for rebalancing, realignment, or other remedial work required to reduce noise and vibration levels. Excessive is defined as exceeding the manufacturer's specifications for the unit in question.
- F. Upon completion of the work, Engineer shall inspect installation and shall inform installing contractor of any further work that must be completed. Make all adjustments as directed by Architect that result from the final inspection. Work shall be done before vibration isolation systems are accepted.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATOR TYPES

- A. General
 - 1. All springs installed out-of-doors shall be cadmium-plated, zinc electroplated or powder-coated after fabrication. Hardware and other metal parts shall be cadmium-plated or galvanized. Galvanizing shall meet ASTM Salt Spray Test Standards and Federal Test Standard No. 14.
 - 2. All isolators installed out-of-doors shall have base plates with bolt holes for fastening the isolators to the support members.
 - 3. Isolator types are scheduled to establish minimum standards. At the Contractor's option, labor-saving accessories can be an integral part of isolators supplied to provide initial lift of equipment to operating height, hold piping at fixed

elevations during installation and initial system filling operations, and similar installation advantages. Accessories and seismic restraint features must not degrade the isolation performance of the isolators.

4. Static deflection of isolators shall be as provided in the EXECUTION section and as shown on the drawings. All static deflections stated are the minimum acceptable deflection for the mounts under actual load. Isolators selected solely on the basis of rated deflections are not acceptable and will be disapproved.

B. Type FSN (Floor Spring and Neoprene)

1. Spring isolators shall be freestanding and laterally stable without any housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Springs shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately 1 (one). All mounts shall have leveling bolts.
2. The spring element in the isolator shall be set in a neoprene cup and have a steel washer or a flat surface in contact with the neoprene to distribute the load evenly over the bearing surface of the neoprene. Alternatively, each isolator shall be mounted on a Type NP isolator. If the NP isolator is used, a rectangular bearing plate of appropriate size shall be provided to load the pad uniformly within the manufacturer's recommended range. If the isolator is to be fastened to the building and the NP isolator is used, GROMMETS shall be provided for each bolt hole in the base plate.
3. If the basic spring isolator has a neoprene friction pad on its base and an NP isolator is to be added to the base, a galvanized steel, stainless steel or aluminum bearing plate shall be used between the friction pad and the NP isolator. If the isolator is outdoors, bearing plates shall not be made of galvanized steel. The NP isolator, bearing plate and friction pad shall be permanently adhered to one another and to the bottom of the isolator base plate.
4. Type FSN isolators shall be one of the following products with the appropriate neoprene pad (if used) selected from Type NP or acceptable equal:

Type SW	A.B.
Type FSS	A.I.
Type SLF	M.I.
Type FDSK	N.C.
Series A	V.M.&C.

C. Type FSNTL (Floor Spring and Neoprene Travel Limited)

1. Spring isolators shall be freestanding and laterally stable without any housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Spring shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately 1 (one). All mounts shall have leveling bolts. All mounts shall have vertical travel limit stops to control extension when weight is removed. The travel limit stops shall be capable of serving as blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts and between the limit stops and the spring to avoid interference with the spring action.
2. The spring element in the isolator shall be set in a neoprene cup and have a steel

washer or a flat surface in contact with the neoprene to distribute the load evenly over the bearing surface of the neoprene. Alternatively, each isolator shall be mounted on a Type NP isolator. If the NP isolator is used, a rectangular bearing plate of appropriate size shall be provided to load the pad uniformly within the manufacturer's recommended range. If the isolator is to be fastened to the building and the NP isolator is used, GROMMETS shall be provided for each bolt hole in the base plate.

3. If the basic spring isolator has a neoprene friction pad on its base and an NP isolator is to be added to the base, a galvanized steel, stainless steel or aluminum bearing plate shall be used between the friction pad and the NP isolator. If the isolator is outdoors, bearing plates shall not be made of galvanized steel. The NP isolator, bearing plate and friction pad shall be permanently adhered to one another and to the bottom of the isolator base plate.
4. Type FSNTL isolators shall be one of the following products, with the appropriate neoprene pad (if used) selected from Type NP or acceptable equal:

Type CTA.B.
 Type RSA.I.
 Type SLR..... M.I.
 Type FLSK.N.C.
 Series AWR V.M.&C.

D. Type FN (Floor Neoprene)

1. Neoprene isolators shall be neoprene-in-shear type with steel reinforced top and base. All metal surfaces shall be covered with neoprene. The top and bottom surfaces shall be ribbed. Bolt holes shall be provided in the base and the top shall have a threaded fastener. The mounts shall include leveling bolts that may be rigidly connected to the equipment.
2. Type FN isolators shall be one of the following products or acceptable equal:

Type RVDA.B.
 Type NCMA.I.
 Type ND M.I.
 Type RDK.N.C.
 Series RD V.M.&C.

E. Type PCF (Precompressed Fiberglass)

1. Precompressed fiberglass blocks shall be made of molded inorganic glass fiber that is individually coated and sealed with an impervious elastomeric membrane. Fiberglass shall be severely overloaded during manufacture to stabilize the material into a product that is permanent and has consistent, predictable dynamic properties.
2. Type PCF isolators shall be one of the following products or acceptable equal.

Type KIPK.N.C.

F. Type NP (Neoprene Pad)

1. Neoprene pad isolators shall be one layer of 1/4" to 3/8" thick ribbed or waffled neoprene. The pads shall be sized so that they will be loaded within the

manufacturer's recommended range.

2. Type NP isolators shall be one of the following products or acceptable equal:

Type NR.....A.B.
Type NP.....A.I.
Type WM.I.
Type NPS.....K.N.C.
Series Shear FlexV.M.&C.

G. Type DNP (Double Neoprene Pad)

1. Neoprene pad isolators shall be formed by two layers of 1/4" to 3/8" thick ribbed or waffled neoprene, separated by a galvanized steel, stainless steel or aluminum plate. If the isolator is outdoors, the plate shall not be made of galvanized steel. These layers shall be permanently adhered together. The pads shall be sized so that they will be loaded within the manufacturer's recommended range.
2. Type DNP isolators shall be formed from one of the following products or acceptable equal:

Type NR.....A.B.
Type DNPA.I.
Type WSWM.I.
Type NPS.....K.N.C.
Series Shear FlexV.M.&C.

H. Type HSN (Hanger Spring and Neoprene)

1. Vibration isolation hangers shall consist of a free standing and laterally stable steel spring and a neoprene element in series, contained within a steel housing. Spring diameters and hanger housing lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc before contacting the housing. Alternatively, other provisions shall be made to allow for a 30° arc of movement of the bottom hanger rod without contacting the isolator housing. Spring diameter shall be not less than 0.8 of the compressed height of the spring at the rated load. Spring elements shall have a minimum additional travel-to-solid equal to 50% of the rated deflection. The neoprene element shall be designed to have a 0.3" minimum static deflection. The deflection of both the spring element and the neoprene element shall be included in determining the overall deflection of Type HSN isolators.
2. Type HSN isolators shall be one of the following products or acceptable equal:

Type BSRA.....A.B.
Type SANSH.....A.I.
Type 30N.....M.I.
Type SRH or SFH.....K.N.C.
Type RSH or RFHV.M.&C.

I. Type HN (Hanger Neoprene)

1. Vibration isolation hangers shall consist of a neoprene-in-shear element contained within a steel housing. A neoprene neck bushing shall be provided where the hanger rod passes through the hanger housing to prevent the rod from

contacting the hanger housing. The diameter of the hole in the housing shall be sufficient to permit the hanger rod to swing through a 30° arc before contacting the hanger housing.

2. Type HN isolators shall be one of the following products or acceptable equal:

Type BRD-A.....A.B.
 Type SANHA.I.
 Type HD M.I.
 Type RH or FHK.N.C.
 Type RHD or RFD..... V.M.&C.

J. Type RI (Roof Isolator)

1. Roof isolators shall meet all of the requirements of the type FSNTL isolator, and shall be provided with waterproof spring covers that allow for the adjustment or removal of the springs. The isolators shall be provided with a structural top plate for the welding or bolting of supplementary support steel. The isolators shall accept 2 inch thick roofing insulation and be capable of being flashed directly into the roof membrane. Each isolator shall be provided complete with a wood nailer and flashing.
2. Type RI isolators shall be one of the following products or acceptable equal:

Type FRS.....A.I.

2.02 EQUIPMENT BASES

A. Type BSR (Base - Steel Rail)

1. Steel rail bases shall consist of structural steel sections sized to provide a rigid beam that will not twist, deform, or deflect in any manner that will negatively affect the operation of the supported equipment or the vibration isolation mounts. Rail bases shall include side mounting brackets for attachment of vibration isolators.
2. Type BSR bases will be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

Type C or CISA.B.
 Type SRA.I.
 Type R or ICS M.I.
 Type KRB or KFBK.N.C.
 Type WFR or AR..... V.M.&C.

B. Type BSF (Base - Steel Frame)

1. Steel base frames shall consist of structural steel sections sized, spaced, and connected to form a rigid base which will not twist, rack, deform, or deflect in any manner which will negatively affect the operation of the supported equipment or the vibration isolation mounts. Frames shall be adequately sized to support basic equipment units and motors plus any associated pipe elbow supports, duct elbow supports, electrical control elements, or other components closely related and requiring resilient support in order to prevent vibration transfer to the building structure. The depth of steel frame bases shall be at least

- 1/10 the longest dimension of the base and not less than 6". The base footprint shall be large enough to provide stability for supported equipment.
2. Frame bases shall include side mounting brackets for attachment to vibration isolators. Mounting brackets shall be located on the sides of the base that are parallel to the axis of rotation of the supported equipment.
 3. Type BSF bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

Type WXA.B.
 Type SBA.I.
 Type WFSL M.I.
 Type SFB or SRBK.N.C.
 Series WFB V.M.&C.

C. Type BIB (Base - Inertia Base)

1. Concrete inertia bases shall be formed of stone-aggregate concrete (150 lb./cu.ft.) and appropriate steel reinforcing cast between welded or bolted perimeter structural steel channels. Inertia bases shall be built to form a rigid base that will not twist, rack, deform, deflect, or crack in any manner that would negatively affect the operation of the supported equipment or the vibration isolation mounts. Inertia bases shall be adequately sized to support basic equipment units and motors plus any associated pipe elbow supports, duct elbow supports, electrical control elements, or other components closely related and requiring resilient support in order to prevent vibration transfer to the building structure. Inertia base depth shall be at least 1/12 the longest dimension of the inertia base and not less than 6". The base footprint shall be large enough to provide stability for supported equipment. Inertia bases shall include side mounting brackets for attachment to vibration isolators. Mounting brackets shall be located on the sides of the base that are parallel to the axis of rotation of the supported equipment.
2. The steel frame and reinforcement shall be supplied by the vibration isolator manufacturer. Concrete may be provided by the General Contractor.
3. Frame and reinforcement for Type BIB bases shall be one of the following products or acceptable equal:

Type CPF.....A.B.
 Type CB.....A.I.
 Type KSL..... M.I.
 Type CIB-L or CIB-H.....K.N.C.
 Series WPF V.M.&C.

D. Type RC-1 (Roof Curb, Type 1)

1. Type RC-1 isolation bases shall be a prefabricated assembly consisting of an extruded aluminum frame and steel spring isolation system that fits over the roof curb and under the isolated equipment. The aluminum frame shall be sufficiently rigid to support the equipment load without detrimental twist or deflection. Spring isolators shall be selected and positioned along the curb to achieve the minimum static deflection called for in the schedule. The static deflection shall be constant around the entire periphery of the base. Springs shall be free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the

rated deflection. Resilient neoprene snubbers shall be provided at the corners of the base to limit the movement of the equipment under wind load to 1/4".

2. The isolation curb base shall be made weather tight by sealing all around the periphery with closed cell neoprene or flexible membrane that shall in no way inhibit the vibration isolation of the spring elements. A closed cell sponge gasket or field caulking shall be used between the equipment unit and the isolation curb base and between the isolation curb and roof curb to form a weather-tight seal. Each spring isolator used in the curbs shall be weather-protected as described in the PRODUCTS section under General.
3. Type RC-1 vibration isolation curb bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

RTIR	A.B.
Type CMAB	M.I.
Type ASR	K.N.C.
Series ATR.....	V.M.&C.

E. Type RC-2 (Roof Curb, Type 2)

1. Type RC-2 isolation bases shall be a prefabricated assembly consisting of a structural steel frame and steel spring isolation system that forms the roof curb under the isolated equipment. The steel frame shall be sufficiently rigid to support the equipment load without detrimental twist or deflection. Spring isolators shall be selected and positioned along the curb to achieve the minimum static deflection called for in the schedule. The static deflection shall be constant around the entire periphery of the base. Springs shall be free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the rated deflection. Spring elements shall include travel limit stops that are capable of serving as blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts as they pass through the limit stop brackets. Springs and limits stops shall be adjusted to limit movement of the equipment under wind load to 1/4".
2. The isolation curb base shall be made weather tight by sealing all around the periphery with closed cell neoprene, flexible membrane or light gauge spring metal loop, which shall in no way inhibit the vibration isolation of the spring elements. A closed cell sponge gasket or field caulking shall be used between the equipment unit and the isolation curb base and between the isolation curb and roof curb to form a weather-tight seal. Each spring isolator used in the curbs shall be weather-protected as described in the PRODUCTS section under General.
3. Type RC-2 vibration isolation curb bases shall be supplied by the isolator manufacturer and shall be one of the following products or acceptable equal:

Type P	A.I.
Type RSC.....	M.I.
Type SSR.....	K.N.C.
Vibrocurb.....	ThyCurb

F. RR (Roof Rail)

1. Roof rail bases shall consist of continuous structural support rails that combine

equipment support and vibration isolation into one unitized assembly. The rails shall incorporate springs that are free standing, laterally stable with a diameter of not less than 0.8 times the compressed height, and have additional travel-to-solid that is at least 50% of the rated deflection. Spring elements shall include travel limit stops that are capable of serving as blocking during erection of the equipment. A minimum clearance of 1/4" shall be maintained around restraining bolts as they pass through the limit stop brackets. Springs and limits stops shall be adjusted to limit movement of the equipment under wind load to 1/4". The entire roof rail assembly shall be an integral part of the roof's membrane waterproofing and shall be dry galvanized or plastic-coated.

2. Type RR roof rail bases shall be one of the following products or acceptable equal:

Type RA.I.

2.03 RESILIENT PENETRATION SLEEVE/SEAL

- A. Resilient penetration sleeve/seals shall be field-fabricated from a pipe or sheet metal section that is 1/2" to 3/4" larger than the penetrating element in all directions around the element, and shall be used to provide a sleeve through the construction penetrated. The sleeve shall extend 1" beyond the penetrated construction on each side. The space between the sleeve and the penetrating element shall be packed with glass fiber or mineral wool to within 1/4" of the ends of the sleeve. The remaining 1/4" space on each end shall be filled with acoustical sealant to form an airtight seal. The penetrating element shall be able to pass through the sleeve without contacting the sleeve. Alternatively, prefabricated sleeves accomplishing the same result are acceptable.

2.04 RESILIENT LATERAL SUPPORTS

- A. These units shall either be a standard product of the vibration isolation mounting manufacturer, or be custom fabricated from standard components. These units shall incorporate neoprene isolation elements similar to Type FN that are specifically designed to provide resilient lateral bracing of ducts or pipes.
- B. Resilient lateral supports shall be one of the following products or acceptable equal:

Type Custom.....A.B.
 Type RPTG.....A.I.
 Type ADAM.I.
 Type RGN.....K.N.C.
 Type MDPA.....V.M.&C.

2.05 THRUST RESTRAINTS

- A. Thrust restraints shall consist of a spring element in series with a neoprene pad. The unit shall be designed to have the same deflection due to thrust-generated loads as specified for the isolators supporting the equipment. The spring element shall be contained within a steel frame and be designed so it can be pre-compressed at the factory to allow for a maximum of 1/4" movement during starting or stopping of the equipment. Allowable movement shall be field-adjustable. The assembly shall be furnished complete with rods and angle brackets for attachment to both the equipment and the adjacent fixed structural anchor. The thrust restraints shall be installed on the discharge of the fan so that the restraint rods are in tension. Assemblies that place the rods in compression are not

acceptable. The holes in the spring restraint brackets through which the restraint rods pass must be oversized to prevent contact between the brackets and rods.

- B. Thrust restraints shall be one of the following products or an acceptable equal:

Type TRK	A.B.
Type TR	A.I.
Type WB	M.I.
Type HSR	K.N.C.

2.06 GROMMETS

- A. Grommets shall be specially formed to prevent bolts from directly contacting the isolator base plate, and shall be sized so that they will be loaded within the manufacturer's recommended load range.
- B. Grommets shall either be custom made by combining a neoprene washer and sleeve, or be one of the following products or an acceptable equal:

Type Isogrommets	MBIS, Inc. (Bedford Heights, OH)
Type WB	Barry Controls (Brighton, MA)
Type HG	Mason Industries, Inc. (Hauppauge, NY)

2.07 ACOUSTICAL SEALANT

- A. Sealants for acoustical purposes as described in this specification shall be silicone or one of the non-setting sealants indicated below:

Acoustical sealant	D.A.P.
BR-96	Pecora
Acoustical sealant	Tremco
Acoustical sealant	U.S.G.

PART 3 - EXECUTION

3.01 APPLICATION

- A. General
1. Refer to the PRODUCTS section of this specification for vibration isolation devices identified on the drawings or specified herein.
 2. The static deflection of all isolators specified herein are the minimum acceptable deflections for the mounts under actual load. Isolators selected solely on the basis of rated deflection are not acceptable and will be disapproved.
- B. Major Equipment
1. Unless otherwise shown or specified, all floor-mounted major equipment shall be set on 4" high concrete housekeeping pads.
 2. Types and minimum static deflections of vibration isolation devices for major equipment items shall be as scheduled on the drawings or specified hereunder.

3. Thrust restraints shall be installed on all suspended fans and on all floor-mounted fans developing 4" or more of static pressure, unless the horizontal component of the thrust force can be demonstrated to be less than 10% of the equipment weight.
- C. Miscellaneous Mechanical Equipment: Miscellaneous pieces of mechanical equipment such as expansion tanks which are connected to isolated piping systems shall be vibration-isolated from the building structure by Type NP or Type HN isolators (selected for 0.1" static deflection) unless their position in the piping system requires a higher degree of isolation as called for under Pipe Isolation.
- D. Pipes
1. All hot water, drain and engine exhaust piping that is connected to vibration-isolated equipment shall be isolated from the building structure within the following limits:
 - a. Within 100' total pipe length of connected vibration-isolated equipment (chillers, pumps, air handling units, etc.)
 2. Piping shall be isolated from the building structure by means of vibration isolators, resilient lateral supports, and resilient penetration sleeve/seals.
 3. Isolators for the first three support points adjacent to connected equipment shall achieve one half the specified static deflection of the isolators supporting the connected equipment. When the required static deflection of these isolators is greater than 1/2", Type FSN or HSN isolators shall be used. When the required static deflection is less than or equal to 1/2", Type FN or HN isolators shall be used. All other pipe support isolators within the specified limits shall be either Type FN or HN achieving at least 1/4" static deflection.
 4. Where lateral support of pipes is required within the specified limits, this shall be accomplished by use of resilient lateral supports.
 5. Pipes within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.
 6. Provide flexible pipe connections as called for under Major Equipment above and wherever shown on the drawings.
- E. Ductwork
1. All sheet metal ducts and air plenums that are within mechanical rooms or within a distance of 50' total duct length of connected vibration-isolated equipment (whichever is longer) shall be isolated from the building structure by Type FN, PCF or HN isolators. All isolators shall achieve 0.1" minimum static deflection.
 2. Ducts within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.

3.02 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT

A. General

1. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment as well as for proper operation.
2. Installation of vibration isolation equipment shall be in accordance with the manufacturer's instructions.

B. Isolators

1. All vibration isolators shall be aligned squarely above or below mounting points of the supported equipment.
2. Isolators for equipment with bases shall be located on the sides of the bases which are parallel to the equipment shaft unless this is not possible because of physical constraints.
3. Locate isolators to provide stable support for equipment, without excess rocking. Consideration shall be given to the location of the center of gravity of the system and the location and spacing of the isolators. If necessary, a base with suitable footprint shall be provided to maintain stability of supported equipment, whether or not such a base is specifically called for herein.
4. If a housekeeping pad is provided, the isolators shall bear on the housekeeping pad and the isolator base plates shall rest entirely on the pad.
5. Hanger rods for vibration-isolated support shall be connected to structural beams or joists, not floor slab between beams and joists. Provide suitable intermediate support members as necessary.
6. Vibration isolation hanger elements shall be positioned as high as possible in the hanger rod assembly, but not in contact with the building structure, and so that the hanger housing may rotate a full 360° about the rod axis without contacting any object.
7. Parallel running pipes may be hung together on a trapeze that is isolated from the building. Isolator deflections must be the greatest required by the provisions for pipe isolation for any single pipe on the trapeze. Do not mix isolated and unisolated pipes on the same trapeze.
8. Pipes, ducts and equipment shall not be supported from other pipes, ducts and equipment.
9. Resiliently isolated pipes, ducts and equipment shall not come in rigid contact with the building construction or rigidly supported equipment.
10. The installed and operating heights of equipment vibration-isolated with Type FSNTL or Type RI isolators or with Type RC-2 or Type RR isolation bases shall be identical. Limit stops shall be out of contact during normal operation. Adjust isolators to provide 1/4" clearance between the limit stop brackets and the isolator top plate, and between the travel limit nuts and travel limit brackets.
11. Adjust all leveling bolts and hanger rod bolts so that the isolated equipment is level and in proper alignment with connecting ducts or pipes.
12. Type RI isolators shall be installed in strict accordance with the manufacturer's instructions.

C. Bases

1. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is acceptable to the equipment manufacturer. This provision shall apply whether or not a base frame is called for on the schedule. In the case that a base frame is required for the unit because of the equipment manufacturer's requirements and is not specifically called for on the equipment schedule, a base frame recommended by the equipment manufacturer shall be provided at no additional expense.
2. Unless otherwise indicated, there is to be a minimum operating clearance of 1" between steel rails, steel frame bases or inertia bases and the floor beneath the equipment. The isolator mounting brackets shall be positioned and the isolators adjusted so that the required clearance is maintained. The clearance space shall

be checked by the Contractor to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.

3. Type RC-2 and Type RR isolation bases shall be installed in strict accordance with the manufacturer's instructions.
- D. Thrust Restraints: Thrust restraints shall be attached on each side of the fan at the vertical centerline of thrust. The two rods of the thrust restraint shall be parallel to the thrust force. This may require custom brackets or standoffs. The body of the thrust restraint shall not come in contact with the connected elements. Thrust restraints shall be adjusted to constrain equipment movement to the specified limit.
- E. Grommets: Where grommets are required at hold down bolts of isolators, bolt holes shall be properly sized to allow for grommets. The hold down bolt assembly shall include washers to distribute load evenly over the grommets. Bolts and washers shall be galvanized.
- F. Resilient Penetration Sleeve/Seals: Maintain an airtight seal around the penetrating element and prevent rigid contact between the penetrating element and the building structure. Fit the sleeve tightly to the building construction and seal airtight on both sides of the construction penetrated with acoustical sealant.

END OF SECTION 230550

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SECTION 230553**PIPE AND VALVE IDENTIFICATION****PART 1 - GENERAL****1.01 SUBMITTALS**

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

1.02 REFERENCES

ANSI A13.1 - Scheme for Identification of Piping Systems

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

W.H. Brady Co., Milwaukee, WI.
Emed Co., Buffalo, NY.
Panduit Corp., Tinley Park, IL.
Seton Nameplate Corp., New Haven, CT.
Bunting Inc., Pittsburgh, PA.

2.02 PIPE MARKERS AND ACCESSORIES

- A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.
- B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.
- C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.
- D. Pipe Marker Legend and Color Field Sizes:

OD of Pipe or Insulation (Inches)	Letter Size (Inches)	Length of Color Field (Inches)
3/4 to 1-1/4 incl.	1/2	8
1-1/2 to 2 incl.	3/4	8
2-1/2 to 6 incl.	1-1/4	12
8 to 10 incl.	2-1/2	24

Over 10	3-1/2	32
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- E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
 - 1. Plain Tape: Unprinted type; color to match pipe marker background.
 - 2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.
- F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

2.03 PIPE SERVICE IDENTIFICATION TAGS

- A. Type: No. 19 B & S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.
- B. Size: 2 inch square tag.
- C. Fasteners: Brass "S" hook or brass jack chain of size as required for pipe to which tag is attached.

2.04 VALVE SERVICE IDENTIFICATION TAGS

- A. Type: No. 19 B & S gage brass, with 1/4 inch high valve service abbreviated lettering on one line over 1/2 inch high valve service chart number, both deep stamped and black filled; and with 3/16 inch top hole for fastener.
- B. Sizes: HVAC Use: 1-1/2 inch dia round.
- C. Fasteners: Brass "S" hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.05 VALVE SERVICE IDENTIFICATION CHART FRAMES

- A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inches valve chart.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Complete testing, insulation and finish painting Work prior to completing the Work of this Section.
- B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.

3.02 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturers printed installation instructions, unless otherwise specified.
- B. Stick-On Pipe Markers:
 - 1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
 - 2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.
- C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified locations, 90 degrees apart on visible side of pipe.
- D. Pipe Service Identifications Tags: Attach tags to piping being identified with “S” hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

- A. Piping Identification Types:
 - 1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
 - 2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
 - 3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.
- B. Identify all piping systems, installed within and exterior of the building, piping exposed to view, above all ceilings, bare and insulated, as to content, size of pipe and direction of flow, with the following exceptions:
 - 1. Piping in furred wall spaces, except in valve access panels where valves and piping shall be identified as specified for exposed piping systems.
 - 2. Piping exposed in finished spaces such as offices, classrooms, wards, toilet rooms, shower rooms and spaces as specified.
- C. Locate piping identification (with in 24”) at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs. Where two or more pipes run in a parallel, place the printed legend and other markers in the same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

- A. Valve Service Identification Tags:
 - 1. Tag service, balance, isolation and control valves installed under this project, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
 - a. Valves in heating, ventilating, air conditioning and refrigeration systems.

B. Valve Service Identification Charts:

1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
2. Hang framed charts at locations as directed.

END OF SECTION 230553

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SECTION 230554**DUCT AND EQUIPMENT IDENTIFICATION****PART 1 - GENERAL****1.01 SUBMITTALS**

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint to the Site in original, new unopened containers, bearing manufacturers' printed labels.
- B. Store materials at the site where directed. Keep storage space clean and accessible to the Engineer at all times.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. Paint: Semi-gloss enamel (latex base) complying with the requirements of FS TT-P-001511.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Do not execute the Work of this Section until all testing, insulation and finish painting Work have been completed.
- B. Place drop cloths or other suitable protection as required to avoid damage and paint spatters on adjacent surfaces.

3.02 DUCT IDENTIFICATION

- A. Identify exposed ductwork, bare or insulated, directly connected to air handling apparatus, in the following spaces or rooms, by means of painted stenciled legends:
 - 1. Mechanical Equipment Room
 - 2. Boiler Room
 - 3. Roof
- B. Locate stenciled legends to be readily visible from any point of observation. Stencil identification along center line of duct, close to equipment. Where view is unobstructed from two directions, apply two sets of stenciling (both sides), visible from each direction.

- C. Letter Size: 1-1/2 inches in height.
- D. Samples of Ductwork Identification:
 - 1. Outside Air (OA)
 - 2. Supply Air (SA)
 - 3. Return Air (RA)
 - 4. Exhaust Air (EA)
- E. Colors: Paint stenciled letters black. Where the background color is dark, paint background white before stenciling.

3.03 EQUIPMENT IDENTIFICATION

- A. Identify mechanical equipment, bare or insulated, installed in the following spaces or rooms, by means of painted stenciled legends:
 - 1. Mechanical Equipment Room – Provide engraved aluminum nameplate
 - 2. Boiler Room – Provide engraved aluminum nameplate
 - 3. Roof – Provide engraved aluminum nameplate
 - 4. At Grade – Provide engraved aluminum nameplate
- B. Paint stenciled legends black, a minimum of 1-1/2 inches (6 inches in Mechanical Equipment Rooms) in height, located to be readily visible from a reasonable point of view. Place identification along center line of equipment, if possible.
- C. Engraved Plastic-Laminate Signs (Interior use where paint stencil is not appropriate.):
 - 1. ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 3. Thickness: 1/16 inch, for units up to 20 square inches or 8 inches length; 1/8 inch for larger units
 - 4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet
- D. Engraved Aluminum Nameplate:
 - 1. Black surface, with white (letter color). Fabricate in sizes required for message. Provide two side holes for mechanical fastening.
 - 2. Engraved with engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 3. Thickness: 0.020 inch.
 - 4. Fasteners: Self-tapping stainless steel screws or aluminum pop rivet
- E. Samples of Equipment Identification:
 - 1. Air Conditioning Unit AC-1
 - 2. Supply Fan S-1

3. Exhaust Fan E-1
4. Return Fan R-1

3.04 ACCESS DOOR IDENTIFICATION

- A. Access doors adjacent to fire damper, smoke damper or smoke detector shall be identified with letters no less than 1/2" high in accordance with NYS MC.

3.05 APPLICATION OF PAINT

- A. Stencil Painting: Apply with a brush or aerosol type spray can.

3.06 CLEANING

- A. Clean adjacent surfaces of paint spatters resulting from the Work of this Section.

END OF SECTION 230554

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SECTION 230593**CLEANING AND TESTING****PART 1 GENERAL****1.01 GENERAL**

- A. Refer to section 230595 "Testing and Measuring of Systems" for additional testing and balancing requirements.

1.02 SUBMITTALS

- A. Quality Control Submittals
 - 1. Test Reports (Field Tests):
 - a. Refrigeration Systems: Submit results of Refrigeration Systems Pressure - Dehydration Tests.
 - b. Hot Water Heating Boilers: Submit results on Boiler Test.
 - c. Propylene Glycol System Test: Submit results on Propylene Glycol Systems.
- B. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
 - 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
 - 2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.04 PROJECT CONDITIONS

- A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.05 SEQUENCING AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Owner at least 5 days in advance of such tests.
- B. Perform cleaning and testing Work in the presence of the Owner.

- C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.
- D. Duct Systems: Clean new and existing duct system(s) before testing, adjusting, and balancing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media (air, gas, refrigerant, vacuum, water): As specified for the particular piping or system under test.
- C. Cleaning Agent (chemical solution, steam, water): As specified for the particular piping, apparatus or system being cleaned.
- D. Propylene Glycol: Permanent type inhibited anti-freeze solution as manufactured by Dow Chemical Co. or Union Carbide. Dowfrost or Ucar Protherm respectively. Final system concentration to be as noted on the drawings.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.
- B. Connections or extension of existing piped systems: Prior to connecting to any existing system(s), the Mechanical Contractor shall take sample of fluid and provide test reports of the existing fluids chemical, residuals and or glycol concentration to the Engineer for acceptance. If the test results have not been provided prior to connection, the Mechanical Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. The Mechanical Contractor shall top off the new or existing glycol feed tank, at project closeout.
- C. Thoroughly clean compressed air, control air, refrigerant pipe and similar systems prior to pressure or vacuum testing.

3.02 PRESSURE TESTS - PIPING

- A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during

test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

B. Water Systems:

1. Circulating water systems, including propylene glycol solution systems and cold water make-up piping connections to heating, ventilating, air conditioning and refrigeration systems, unless otherwise specified:
 - a. Before final connections are made perform hydrostatic test at 1-1/2 times the maximum working pressure, but not less than 125 psig, for 4 hours.
 - b. After final connections are made perform hydrostatic retest at a pressure equal to maximum operating system design pressure, but not less than 30 psig, for 4 hours.

C. Pump Discharge Piping: Before final connections are made perform hydrostatic test at 1-1/2 times maximum working pressure, but not less than 150 psig for one hour.

D. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.

E. Air Piping:

1. Compressed Air: Test with air at 150 psig for one hour.
2. Control Air: Test with air at 50 psig for one hour.
3. Check joints for leaks with soap suds.

F. Vacuum Piping: Perform air test at 150 psig for one hour, followed by a vacuum test of 25 inches Hg for one hour, during which time the mercury shall remain stationary for the last 30 minutes of test.

3.03 TESTING OF EQUIPMENT, APPARATUS AND APPURTENANCES

A. Hot Water Boilers: If boiler is field erected, perform hydrostatic test at 30 psig, after installation, with piping connections shut-off.

3.04 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS - CLEANING AND OPERATIONAL TESTING

A. Circulating Water Systems:

1. Cleaning: Flush systems and apparatus, upon completion of pressure and miscellaneous tests. Completely open valves and flush each system with clean water, prior to chemical cleaning. Repeatedly flush at short intervals until twice the system water capacity has been flushed through. Chemically clean systems immediately following flushing operations. Circulate a solution consisting of Citri-Clean in dilution rates as indicated by manufacturer. Completely fill system with cleaning solution; vent system and place in operation, with automatic controls operating and valves fully open. Allow system to reach design operating temperature or an operating temperature designated by the Owner's

Representative. Circulate the solution through the system for a minimum of 4 consecutive hours; immediately drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during cleaning operations. Remove and clean strainer screens prior to operational test. Refill system with clean water.

2. Operational Test: Run system in an automatic mode for a minimum of 120 consecutive hours. During this time, make final adjustments, including the setting of the balancing valves.

B. Propylene Glycol Systems:

1. Clean as specified for circulating water systems.
2. Drain system and refill with water/propylene glycol mix. Add water or glycol as needed to obtain required mixture level.
3. Perform operational test as specified for circulating water systems with propylene glycol solution in system.

3.05 DUCT SYSTEM AND EQUIPMENT CLEANING

A. Duct Systems:

1. Use service openings for entry and inspection.
 - a. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Ductwork Accessories" for access panels and doors.
 - b. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - c. Remove and reinstall ceiling to gain access during the cleaning process.
2. Particulate Collection and Odor Control:
 - a. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - b. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

B. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.

5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

C. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.06 REFRIGERATION SYSTEMS - TESTING, DEHYDRATION AND CHARGING

A. Leak Test Procedure:

1. Refrigerant Piping Systems:
 - a. Pressurize with dry nitrogen to 50 psig and test for leaks using a bubble type solution.
 - b. Release this partial test pressure and correct deficiencies.
 - c. Charge system with a trace of refrigerant to 15 psig, then add dry nitrogen until system test pressures are reached and retest for leaks with an electronic leak detector.
 - d. Release pressure, repair leaks and retest as necessary until no leaks occur.
 - e. Recover refrigerant used for leak testing.
2. System Test Pressures:
 - a. Charge system with dry nitrogen and trace of refrigerant (HFC 134A, HFC 245, HFC 404, HFC 407C, HFC 410A or HFC 507) to 350 psig and retest for leaks with an electronic leak detector. The system must stay at 350 psig pressure for 24 hours to pass the system test pressure test.
 - b. Release pressure, repair leaks and retest as necessary until no leaks occur.
 - c. Recover refrigerant used for leak testing.

B. Dehydration:

1. Low and Ultra Low Temperature Refrigeration Systems (-30 degrees F to 32 degrees F):
 - a. Following pressure tests, dehydrate each system with a vacuum pump.
 - b. Draw and hold an initial vacuum of 800 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.

- c. Draw and hold a second vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
 - d. Draw and hold a third vacuum of 250 microns for 8 to 12 hours with an allowable maximum rise of 50 microns. Break this third vacuum by adding liquid refrigerant specified for the equipment to the high side of the system (liquid line).
 - e. Verify vacuum obtained with an electronic vacuum gage.
 - 2. Medium Temperature Refrigeration Systems (33 degrees F to 55degrees F), and Air Conditioning Systems:
 - a. Following pressure tests, dehydrate each system with a vacuum pump.
 - b. Draw and hold an initial vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
 - c. Draw and hold a second vacuum of 500 microns. Break this vacuum by pressurizing with dry nitrogen to 10 psig, and change oil in vacuum pump.
 - d. Verify vacuum obtained with an electronic vacuum gage.
- C. Refrigerant Charging: Follow equipment manufacturer's printed charging directions unless otherwise specified.
 - 1. Introduce refrigerant of type and quantity required through a filter/drier installed in the temporary charging line.
 - a. Purge small amount of liquid out of the system side of the charging hose.
 - b. Prevent moisture and other contaminants from entering the system.
 - 2. Charge liquid refrigerant through a charging valve provided in the high pressure side of the system.
 - a. Small amounts of gaseous refrigerant may be charged through the compressor suction service valve port.
 - 3. No bubbles shall appear at the moisture-liquid indicator when the system is fully charged and operational. Do not overcharge.
 - 4. Record the weight in pounds of refrigerant charged into each system and submit this record to the Owner.
- D. Compressor Oil Charge: Pump oil into the compressor after the last vacuum has been preformed. Follow all Manufactures Recommended for oil type and amount to be installed.
- E. Adjustments and Operational Testing:
 - 1. Adjustments: Place the system in operation with automatic controls functioning. Adjust controls and apparatus for proper operation. Test thermometers and gages for accuracy over the entire range. Remove and replace items found defective.
 - a. Check belts, fan blades, fittings, TXV bulbs, and electrical connections for tightness before start up.
 - b. Check TXV bulb for proper location should be between 8 and 10 o'clock or 2 & 4 o'clock.
 - c. Seal off all holes in the condition space as specified.
 - d. Provide a point to point control check of the system to ensure that the specified inputs and outputs are receiving the signal from the proper sensors or controlling the proper device.
 - e. Set pressure controls and safety controls.
 - f. Close or de-energize all solenoids, and start up the system.

- g. Check that all controls and safety switches are operating properly.
 - h. Adjust TXV for proper super heat back to the compressors.
 - i. Clean TXV strainers as many times as required.
 - j. After one week of run time, change the liquid cores if they are the replaceable type.
 - k. After one month of run time, replace the liquid cores and compressor suction socks. Replace the liquid cores as required. Clean the TXV's as required.
2. Operational Test:
- a. Place system in operation, with final connections to equipment and with automatic controls operating, and operate for a minimum of 120 consecutive hours.
 - b. Operational test shall prove to the satisfaction of the Owner that the system can produce the cooling effect required by the drawings and the specifications.

3.07 INSTALLATION

- A. Automatic Glycol Feed Package, complete with valves and piping, as recommended by the equipment manufacturer and indicated on the drawings.
- B. Glycol System(s): following system cleaning, fill specified glycol system and feed tank to indicated percentage of glycol/water solution indicated. Glycol feed tank shall be topped off at project closeout.
- C. Connections or extension of existing glycol piping systems: Prior to connecting to the existing system(s), the Mechanical Contractor shall take sample of fluid and provide test reports of the existing fluids concentration of glycol and residuals to the Engineer for acceptance. If the test results have not been provided prior to connection, the Mechanical Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. The Mechanical Contractor shall top off the new or existing glycol feed tank, at project closeout.

END OF SECTION 230593

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SECTION 230594**BALANCING OF SYSTEMS****PART 1 GENERAL****1.01 SUBMITTALS****A. Quality Control Submittals:**

1. Testing, Adjustment and Balancing Reports: Submit final testing and balancing results on applicable report forms, as approved or furnished by the environmental systems balancing council or bureau, which is certifying the independent member agency performing the Work, required by this Section. Each final systems report form shall bear the signature of the person performing the Work and recording the data and the signature of the certified supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

1.02 QUALITY ASSURANCE**A. Qualifications:**

1. Provide the services of a certified independent agency for the testing, adjustment and balancing of all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC, Washington, DC 20005, National Environmental Balancing Bureau - NEBB, Arlington, Va. 22209 or by pre-approval of the engineer.
2. The Work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The supervisor shall be personally certified by the national council or bureau, as approved by the Engineer.

1.03 SEQUENCING AND SCHEDULING**A. Scheduling:**

1. Perform environmental systems testing and balancing after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
2. Test and balance system during a period of time when outside temperature conditions will impose a significant load on the system; i.e., summer months for air conditioning system, winter months for heating system. Balance and adjust systems accordingly. Return to the site as required.
3. Send written notification to the Owner's Representative a minimum of five days prior to the performance of testing and balancing Work. Perform testing and balancing Work in the presence of the Owner's Representative.

1.04 ACCURACY

- A.** Outlets and equipment shall be balanced to within 5% of design airflows. Portions of

systems unable to be balanced to these criteria shall be brought to the attention of the Engineer.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. General Information: Test instruments are included in this specification for information only. Balancing of air and hydronic systems shall be performed by qualified personnel utilizing company owned test instruments, which will remain the property of the company. Use test instruments which are in first class operating condition, with individual calibration histories to guarantee their accuracy. Test instruments shall be of type and kind as required by the type of system installed. Trade names and manufacturer's names are mentioned in this section for descriptive purposes only; instruments of equivalent range and capabilities may be utilized.
- B. Air Balancing Instruments:
 - 1. Manometers: Inclined with ranges of 0 to 1/4" and 0 to 1"; Combination inclined and vertical with a range of 0 to 5" and U tube type, 18".
 - 2. Portable "Magnehelic" Draft Gages: Ranges 0 to 1/2", 0 to 1" and 0 to 5".
 - 3. Anemometers: Deflecting vane type with a range of 100 to 3000 fpm, similar to Alnor Velometer Model 6000 BP and 4" diameter rotating vane type.
 - 4. Pitot Tubes: ASHRAE standard type, stainless steel, 5/16" diameter, lengths as required.
 - 5. Sling Psychrometer.
 - 6. Smoke Candles and Smoke Generator.
 - 7. Flowhoods with hoods to match air outlet sizes used on project.
- C. Hydronic Balancing Instruments:
 - 1. Calibrated Test Gages: Ranges 0 to 30 lbs., 0 to 60 lbs., 0 to 200 lbs.
 - 2. Calibrated Test Gages (Compound Type): Ranges from -30" to 30 lbs. and -30" to 60 lbs.
 - 3. U Tube Manometer: 36".
- D. Air and Hydronic Systems Balancing Instruments:
 - 1. Thermometers: 12" mercury column type and dial type, with a range of -40 to +120 degrees F. and 0 to 220 degrees F. Total of four thermometers.
 - 2. Universal Hand Tachometer: Herman H. Sticht Type UH.
 - 3. Stop Watch.
 - 4. Stroboscope.
 - 5. Contact Pyrometer: Thermocouple type.
 - 6. Volt-Ohm-Ammeter Test Kit, High Current Type: Sperry "Ohmprobe".
 - 7. Volt-Ammeter: With leads for connecting to lugs.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Inspection: Prior to the environmental testing and balancing of hydronic and air distribution systems, the certified supervisor in the employ of the testing and balancing agency shall inspect the installations and notify the Owner's Representative of any Work which must be performed or modified prior to initiating testing and balancing procedures.
- B. Performance: Test and balance environmental hydronic and air distribution systems, including all connected equipment and apparatus, so as to conform to the design conditions. Perform the Work of this section in accordance with the published standards of the balancing council or bureau, which is certifying the member firm. Record all test readings, calculations and results.

END OF SECTION 230594

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SECTION 230595**TESTING AND MEASURING OF SYSTEMS****PART 1 GENERAL****1.01 SCOPE OF WORK**

- A. The scope of work includes measuring and reporting air flows, chilled water, hot water and heat pump water flow rates (all if applicable) for the scope of work indicated on the plans. Balancing reports shall include the following:
 - 1. Measure supply air, return air and outside air flow rates at each air-handling unit.
 - 2. Measure air flow rate at each exhaust fan.
 - 3. Measure airflow at each supply, return, transfer, and exhaust register in each building.
 - 4. Measure water (chilled, hot, heat pump) water flow rates at main distribution pumps for each system and at all air-handling units, chillers, boilers, and cooling towers (all if applicable).
- B. Each contractor is required to review existing drawings and walk through each building prior to submitting bid.
- C. This contractor is required to mark-up owner furnish as-built drawings indicating any changes made to mechanical systems which aren't indicated on as-builts.
- D. This contractor shall report of system deficiencies discovered during testing.
- E. Refer to section 230593 "Cleaning and Testing" for additional testing requirements.

1.02 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Testing, AND Measuring Reports: Submit testing and measuring results on applicable report forms, as approved or furnished by the environmental systems balancing council or bureau, which is certifying the independent member agency performing the Work, required by this Section. Each final systems report form shall bear the signature of the person performing the Work and recording the data and the signature of the certified supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. This contractor must be a certified independent testing, adjustment and balancing agency capable of measuring all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC,

Washington, DC 20005, or by National Environmental Balancing Bureau - NEBB, Arlington, Va. 22209.

2. The Work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The supervisor shall be personally certified by the national council or bureau, as approved by the Engineer.

1.04 SEQUENCING AND SCHEDULING

A. Scheduling:

1. Perform environmental systems testing and measuring after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
2. Test and measure system during a period of time when outside temperature conditions will impose a significant load on the system; i.e., summer months for air conditioning system, winter months for heating system. Return to the site as required.
3. Send written notification to the Owner's Representative a minimum of five days prior to the performance of testing and measuring Work. Perform testing and balancing Work in the presence of the Owner's Representative.

1.05 ACCURACY

- ##### **A. Outlets and equipment shall be measured to within 5% of design airflows.**

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- ##### **A. General Information:** Test instruments are included in this specification for information only. Testing of air and hydronic systems shall be performed by qualified personnel utilizing company owned test instruments, which will remain the property of the company. Use test instruments which are in first class operating condition, with individual calibration histories to guarantee their accuracy. Test instruments shall be of type and kind as required by the type of system installed. Trade names and manufacturer's names are mentioned in this section for descriptive purposes only; instruments of equivalent range and capabilities may be utilized.
- ##### **B. Air testing Instruments:**
1. Manometers: Inclined with ranges of 0 to 1/4" and 0 to 1"; Combination inclined and vertical with a range of 0 to 5" and U tube type, 18".
 2. Portable "Magnehelic" Draft Gages: Ranges 0 to 1/2", 0 to 1" and 0 to 5".
 3. Anemometers: Deflecting vane type with a range of 100 to 3000 fpm, similar to Alnor Velometer Model 6000 BP and 4" diameter rotating vane type.
 4. Pitot Tubes: ASHRAE standard type, stainless steel, 5/16" diameter, lengths as required.
 5. Sling Psychrometer.
 6. Smoke Candles and Smoke Generator.
 7. Flowhoods with hoods to match air outlet sizes used on project.

C. Hydronic Testing Instruments:

1. Calibrated Test Gages: Ranges 0 to 30 lbs., 0 to 60 lbs., 0 to 200 lbs.
2. Calibrated Test Gages (Compound Type): Ranges from -30" to 30 lbs. and -30" to 60 lbs.
3. U Tube Manometer: 36".

D. Air and Hydronic Systems Testing Instruments:

1. Thermometers: 12" mercury column type and dial type, with a range of -40 to +120 degrees F. and 0 to 220 degrees F. Total of four thermometers.
2. Universal Hand Tachometer: Herman H. Sticht Type UH.
3. Stop Watch.
4. Stroboscope.
5. Contact Pyrometer: Thermocouple type.
6. Volt-Ohm-Ammeter Test Kit, High Current Type: Sperry "Ohmprobe".
7. Volt-Ammeter: With leads for connecting to lugs.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Inspection: Prior to the environmental testing and measuring of hydronic and air distribution systems, the certified supervisor in the employ of the testing and balancing agency shall inspect the installations and notify the Owner's Representative of any Work which must be performed or modified prior to initiating testing and balancing procedures.
- B. Traverse Method: Rectangular duct traverses shall be performed using the log-Tchebycheff method. Equal-area method shall not be used.
- C. Performance: Test and measure environmental hydronic and air distribution systems, including all connected equipment and apparatus. Perform the Work of this section in accordance with the published standards of the balancing council or bureau, which is certifying the member firm. Record all test readings, calculations and results.

END OF SECTION 230595

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SECTION 230713**DUCT INSULATION****PART 1 GENERAL****1.01 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Insulation Schedule: Schedule shall list all systems and indicate by system the type of insulation, jacketing, etc, to include manufacturer's model number and size for each service application.
- C. Product Data for each Insulation type. Manufacturer's catalog sheets, specifications, and installation instructions for each item specified, excluding Miscellaneous Materials.

1.02 QUALITY ASSURANCE

- A. Qualifications: The persons and supervisors performing the Work of this section shall be personally experienced in installing insulation and shall have been regularly performing such work for a minimum of 3 years while in the employ of a company or companies engaged in the installation of piping insulation.
- B. Regulatory Requirements:
 - 1. Fire and Smoke Hazard Ratings: Duct insulation installed inside a building, duct lining materials, Class 1 and 2 jacketing materials, mastics, and adhesives shall have a maximum flame spread rating of 25 and a maximum fuel contributed and smoke developed rating of 50 or less, when tested in accordance with ASTM E84 and UL723.

PART 2 PRODUCTS**2.01 INSULATION MATERIALS**

- A. Insulation for ductwork shall be fibrous glass with a factory applied laminated foil - scrim - kraft jacket of Class as specified and as follows:
 - 1. (Type-1) Fiberglass Board insulation with a factory applied Class 1 jacket. Preformed, flat, rectangular rigid material, R-Value as specified, having a density of 3.0 pcf, a thermal conductivity (k value at 75 degrees F.) of 0.23 conforming to ASTM C612, with a factory applied Class 1 jacket.
 - 2. (Type-2) Fiberglass Flexible Board insulation with a factory applied Class 1 jacket. Preformed, flat, rectangular rigid material, R-Value as specified, having a density of 3.0 pcf, a thermal conductivity (k value at 75 degrees F.) of 0.23 conforming to ASTM C612, with a factory applied Class 1 jacket.
 - 3. (Type-3) Fiberglass Blanket insulation with a factory applied Class 2 jacket. Roll

type, flexible material, R-Value as specified, having a density of 1.0 pcf, a thermal conductivity (k value at 75 degrees F.) of 0.27, conforming to ASTM C553 with a factory applied Class 2 jacket.

4. (Type-4) Flexible Sheet Foam Plastic insulation. Chemically expanded unicellular elastomeric material possessing the following physical characteristics: R-Value as specified. Flexible sheet form having a density of 6 pcf; a thermal conductivity (k value at 75 degrees F.) of 0.28 max.; operating temperature range of -20 to 200 degrees F., and a self-extinguishing fire resistance rating in accordance with ASTM D1692. Provide UV protective for all outdoors installations and indoors where exposed to sunlight.

- B. Insulation Values: Provide the specified insulating value as required, the insulation value shall be the **installed** R-Value

2.02 JACKET MATERIALS

- A. When conditions permit, factory applied jacketing materials to insulation.
- B. Laminated Jacket:
 1. (Class-1) Permanent, fire resistant, non-corrosive type having a UL flame spread rating of 25 or less, a fuel contributed and smoke developed rating of 50 or less, a vapor transmission rate of 0.02 perms or less. Jacket materials shall be as follows:
 - i. (Class-1) - Heavy duty 0.7 mil thick aluminum foil and white kraft paper laminate, reinforced with glass fiber scrim or fiber glass yarn, not less than 4 per inch in both directions.

2.03 ADHESIVES, SEALANTS AND CEMENTS: (Cereal base adhesives will not be accepted).

- A. Vapor Seal Adhesive: B. Foster 85-20, Childers' CP-82, or Epolux Cadaprene 400.
- B. Vapor Barrier Mastic: B. Foster 30-35, Childers' CP-30, or Epolux Cadalar 670.
- C. Joint Sealer for use with Fibrous Glass Insulation: B. Foster 30-45, Childers' CP-30 or Epolux Cadalar 670.
- D. Adhesive for Flexible Foamed Plastic: Armstrong Cork Co. 520, B. Foster 82-31, Childers' CP-80 or Epolux Cadaprene 488.

2.04 MISCELLANEOUS MATERIALS

- A. Duct and Equipment Insulation Fasteners: Weld pin type complete with a speed washer, or suitable clip for supporting the insulation. Fasteners shall be Graham Weld Pins, Duro Dyne Spotter Pins or Clip Pins.
- B. Sealing Tape for Sealing Joints in Duct Insulation: Same materials as the jacket, as manufactured by Arno Adhesive Tapes, Inc., Compac Corp., Fasson or Morgan Adhesive Company.
- C. Metal Corner Angles: 2" x 2" x 28 gage galvanized sheet metal.

- D. Prefabricated Metal Corner Angle Tape: Minimum 28 gage flexible metal bonded to vapor barrier material of the same Class as the insulation jacketing material.
- E. Ductwork Insulation Filler Pieces: Preformed, flat, rectangular material, of thickness as specified, having a density of 6 pcf, conforming to ASTM C612.

PART 3 EXECUTION

3.01 PREPARATION

- A. Preliminary Work: Clean and dry ductwork, prior to insulating.

3.02 INSTALLATION, GENERAL

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, except as specified otherwise

3.03 INSTALLATION

- A. General: Provide insulation as scheduled below, as a minimum, insulate all HVAC systems provided in this project in compliance with 2020 Energy Conservation Construction Code of New York State. Where the insulation scheduled or noted in the construction documents exceeds the Energy Code, the greater requirement shall be provided. HVAC Systems provided but not indicated in the schedule below, however require insulation per the Energy Code, shall be provided as part of this project.

APPLICATION	MAT'L	THICKNESS / [Min. R-VALUE]	JACKET	ADD'L JACKET
Supply Duct				
Above ceilings	Type-3	2" [R-6]	Class-1	
Above ceilings, under insulated roofs.	Type-3	2" [R-6]	Class-1	
Above insulated ceilings, under roofs	Type-1	3" [R-12]	Class-1	
Exposed in finished spaces (1)	Type-1	1-1/2" [R-6]	Class-1	
Exposed in un-finished spaces (2)	Type-1	1-1/2" [R-6]	Class-1	Class-2
Exterior of the building, Rectangular duct construction.	Type-1 or 4	3" [Min R-12] (7)	Class-1	Class-3
Exterior of the building, Round duct construction	Type-1 or 4	3" [R-12]	Class-1	Class-3
Exposed in un-conditioned spaces	Type-1	1-1/2" [R-6]	Class-1	Class-2 (3)
Non accessible, un-conditioned spaces (4)	Type-1	3" [R-12]	Class-1	
Return Duct				
Above ceilings	None			
Above ceilings, under insulated roofs.	None			
Above ceilings, return air plenums	None			
Above insulated ceilings, under roofs	Type-1	3" [R-12]	Class-1	
Exposed in finished spaces (1)	Type-1	1-1/2" [R-6]	Class-1	
Exposed in un-finished spaces (2)	Type-1	1-1/2" [R-6]	Class-1	Class-2
Exterior of the building,	Type-1 or 4	3" [Min R-12] (7)	Class-1	Class-3

Rectangular duct construction.				
Exterior of the building, Round duct construction	Type-1 or 4	3" [R-12]	Class-1	Class-3
Exposed in un-conditioned spaces	Type-1	1-1/2" [R-6]	Class-1	Class-2 (3)
Non accessible, un-conditioned spaces (4)	Type-3	3" [R-12]	Class-1	
OA Duct				
Above ceilings	Type-3	2" [R-6]	Class-1	
Exposed in finished spaces	Type-1	1-1/2" [R-6]	Class-1	
Exposed in un-finished spaces (2)	Type-1	1-1/2" [R-6]	Class-1	Class-2
Exposed in un-conditioned spaces (3)	Type-1	1-1/2" [R-6]	Class-1	Class-2 (4)
Non accessible, un-conditioned spaces (5)	Type-3	3" [R-6]	Class-1	
Exposed in un-conditioned OA mixed with RA	Type-1	1-1/2" [R-6]	Class-1	Class-2 (4)
OA mixed with RA Duct (8)				
Above ceilings	Type-3	2" [R-6]	Class-1	
Exposed in finished spaces	Type-1	1-1/2" [R-6]	Class-1	
Exposed in un-finished spaces (2)	Type-1	1-1/2" [R-6]	Class-1	Class-2
Exposed in un-conditioned spaces (3)	Type-1	1-1/2" [R-6]	Class-1	Class-2 (4)
Non-accessible, un-conditioned spaces (5)	Type-3	2" [R-6]	Class-1	
Exposed in un-conditioned OA mixed with RA	Type-1	1-1/2" [R-6]	Class-1	Class-2 (4)
Exhaust Air Duct				
Above ceilings (6)	Type-3	2" [R-6]	Class-1	
Exposed in finished spaces (6)	Type-1	1-1/2" [R-6]	Class-1	Class-2
Relief Air Duct				
Above ceilings (6)	Type-3	2" [R-6]	Class-1	
Exposed in finished spaces (6)	Type-1	1-1/2" [R-6]	Class-1	Class-2

Comments

- 1) Ductwork serving the same space in which it serves, and is exposed to view, duct insulation is not required. When ductwork is exposed to view, but does not serve the space where exposed, ductwork shall be insulated as scheduled.
- 2) Unfinished spaces, which are considered utility use, such as: Boiler rms, mechanical equipment, fan rms, electrical rms, store rms, janitor, basements, and service passages.
- 3) Un-conditioned spaces: which have no heating or cooling means, such as garages, loading docks.
- 4) Provide jacket to 96" AFF.
- 5) Non-accessible and unconditioned spaces: crawl spaces, above ceilings of spaces not conditioned
- 6) Ductwork between exterior of the building and damper (control or back draft).
- 7) Provide on flanged duct, one layer 1-1/2" board without vapor barrier between duct flanges followed by a continuous layer of 1-1/2" board with vapor barrier, with the exterior membrane wrap applied.
- 8) OA mixed with RA, defined as: OA non-tempered outside air (IE: heated or cooled by mechanical means) combined with RA (return air) ductwork.

B. Board Insulation:**1. Board Insulation Application:**

- a. Secure insulation to ductwork, with duct insulation fasteners spaced 3" in from all corners of ducts, with intermediate fasteners on maximum 16" centers in all directions. Butt all edges of insulation and fill all voids with similar insulation.
- b. Install board type insulation with a Class 1 jacket. When ductwork cross seams, angle bracing or reinforcing are higher than the insulation thickness, increase insulation thickness to be equal to or greater than the H (height) dimension of the cross seam, angle bracing or reinforcing member.
- c. Seam minimum 1½" wide longitudinal jacket laps continuously with vapor barrier lap adhesive. Lap circumferential joints with 4" wide jacket material and seal laps continuously with vapor barrier lap adhesive, or seal continuously with a minimum 3" wide pressure sensitive sealing tape, of the same material as the jacket. Install metal corner angles or prefabricated corner angle tape, over the jacketed insulated corners. Seal exposed ends of insulation with vapor barrier mastic. Vapor seal all breaks in vapor barrier jacketing, all exposed surfaces of duct insulation fasteners and metal corner angles, with pressure sensitive sealing tape of the same material as the jacket or coat with vapor barrier mastic.
- d. Trapeze Hangers: Place trapeze hangers, fabricated of steel rods and structural steel channels or angles, outside the jacketed insulated ducts. Install high-density insulation pieces, of thickness equal to the insulation, a minimum of 4" in width by the bottom dimension of the duct, at all points of support. Continuously jacket all insulated ducts and filler pieces through all supports.
- e. Miscellaneous Board Insulation Application: Insulate air handling equipment, not furnished with a factory applied insulated jacket or internal insulation as specified under sections of this specification, with fibrous glass board with a Class 1 jacket, installed and finished as specified for exposed ductwork in a finished space.
- f. Provide Flexible board: When surface applications are not conducive for the use rigid board insulation. For use on round or radius equipment or ductwork. Application of flexible board insulation shall be as directed for rigid board application.

C. Blanket Insulation:

1. Blanket Insulation Application: Install insulation with all longitudinal joints overlapped a minimum of 2" and butt or lap all circumferential joints. Secure longitudinal and circumferential joints with flare door staples. Install duct insulation fasteners on the bottom side of all horizontal duct runs, when the bottom dimension of the duct is in excess of 32" in width. Install duct insulation fasteners on the sides of all duct risers having a dimension over 24" in size. Space fasteners in accordance with the following schedule:

DUCT DIMENSION	SPACING OF FASTENERS (Min.)
Up to 32"	None required on horizontal runs, 1 row – 16" on center on all duct riser sides over 24" in size.

33" to 48"	2 rows – 16" on centers
49" to 60"	3 rows – 16" on centers
61" and over	16" on center in all directions.

2. Trapeze Hangers: Place trapeze hangers, fabricated of steel rods and structural steel channels or angles, outside the jacketed insulated ducts. Install high-density insulation pieces, of thickness equal to the insulation, a minimum of 4" in width by the bottom dimension of the duct, at all points of support. Continuously jacket all insulated ducts and filler pieces through all supports.

D. Bench Insulated Ductwork:

1. Insulate ducts prior to erection in place when ducts are required to be installed proximate to walls, ceilings, equipment, structural steel or other ductwork, which will not permit adequate space for the installation of insulation, at a later date. Exercise reasonable care in the installation of bench insulated ductwork, so that insulated surfaces are in perfect condition before and after installation.

3.04 SCHEDULE OF ITEMS NOT TO BE INSULATED

A. Do not insulate the following ductwork items:

1. Return fans.
2. Exhaust fans.
3. Flexible fabric ductwork connections.
4. Sound absorbers.

Note: Provide exterior duct insulation on lined ductwork. The exterior duct insulation R-value may be reduced such that the minimum combined R-value of the liner and ext insulation meets or exceeds minimum required R-value.

3.05 FIELD QUALITY CONTROL

- A. Field Samples: The Owner may at their discretion, take field samples of installed insulation for the purpose of checking materials and application. Re-insulate sample cut areas.

END OF SECTION 230713

MP:xx

SECTION 230719**PIPING INSULATION****PART 1 GENERAL****1.01 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Insulation Schedule: Schedule shall list all systems and indicate by system the type of insulation, jacketing, etc, to include manufacturer's model number and size for each service application.
- C. Product Data for each Insulation type. Manufacturer's catalog sheets, specifications, and installation instructions for each item specified, excluding Miscellaneous Materials.

1.02 DEFINITIONS

- A. Cold Service Insulation: Insulation on piping and/or equipment conveying fluids at below ambient temperatures.
- B. Hot Service Insulation: Insulation on piping and/or equipment conveying fluids at above ambient temperatures.
- C. Dual temperature service shall follow cold service requirements.

1.03 QUALITY ASSURANCE

- A. Qualifications: The persons and supervisors performing the Work of this section shall be personally experienced in installing insulation and shall have been regularly performing such work for a minimum of 3 years while in the employ of a company or companies engaged in the installation of piping insulation.
- B. Regulatory Requirements:
 - 1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS**2.01 INSULATION**

- A. (Type-A) Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
 - 1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM 547:

- a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
 2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
 3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
 - a. Suitable for temperatures up to 450 degrees F.
- B. (Type-B) Flexible Elastomeric Foam Insulation:
1. FM tested and approved, meeting the following:
 - a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
 - b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
 - c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
 2. Pipe Insulation: ASTM C 534, Type I.
 3. Polyethylene and polyolefin insulation is not acceptable.

2.02 JACKET MATERIAL

- A. All Purpose Jacket: Vapor barrier type, factory or field applied over fiberglass insulation, comprised of a Kraft paper outer cover bonded to aluminum foil, and reinforced with fiberglass yarn. Jacket material shall be treated for permanent fire and smoke resistance. A vapor barrier jacket seal shall be accomplished with a 1-1/2" longitudinal flap, and 3" wide butt strips, factory supplied, for making circumferential joints.
1. Fire and Smoke Hazard Classification Rating (composite, including jacket and adhesive, ASTM E-84):
 - a. Flame Spread: 25 or less.
 - b. Smoke Developed: 50 or less.
 2. Water Vapor Permeability (ASTM E-96): 0.02 perm.
 3. Tensile Strength: 40 lb./in. width.
 4. Mullen Burst: 70 psi.
- B. Waterproof Membrane:
- Waterproofing, High performance prefabricated 13-ply self-adhering, sheet-type waterproofing membrane with flexible aluminum material. Jacketing shall perform -30 degF to +300 degF service temperature. Zero weather and vapor moisture permeability, high puncture / tear resistance, mold inhibiting agents. Apply materials in complete accordance with the manufacturer's printed instructions manual. Furnish color (aluminum or white) as directed by Architect. Provide VentureClad Plus 1579CW or acceptable equal.

2.03 FITTING INSULATION

- A. Fiberglass Insulation System:

1. Pre-molded fitting insulation: Same thickness as the adjacent pipe covering.
 - a. Conform to FS-HH-I-558C, Form E, Class 16.
 2. PVC/Fiberglass Fitting Insulation: Polyvinyl chloride pre-molded flexible fitting cover with batt type, pre-cut fiberglass insert.
 - a. PVC: Conform with FS L-P-535C, Composition A, Type II, Grade GU.
 - b. Fiberglass: Conform with FS HH-I-558C, Form B, Type I, Class 7&8.
 3. Miter Cut Fitting Insulation: Fabricated from materials employed for pipe insulation.
- B. Flexible Elastomeric Foam Insulation System: Miter cut fitting insulation, fabricated from materials employed for pipe insulation.

2.04 MISCELLANEOUS MATERIALS

- A. Adhesive:
1. Vapor Barrier Jacket Adhesive: Foster Products Division, 85-20; Childers, CP-82; Epolux, Cad-o-prene, 400.
 2. Reinforcing Membrane Adhesive: Foster Products Division 30-36; Childers, CP-50; Epolux, Cadalag 336.
 3. Flexible Elastomeric Foam Adhesive: Foster Products Division, 85-75; Epolux, Cad-o-prene, 488; Armstrong, 520.
- B. Joint Sealant for Fiberglass Insulation: Foster Products Division, 30-45; Childers, CP-30; Epolux, 670.
- C. Vapor Barrier Coating: Foster Products Division, 30-35; Childers, CP-30; Epolux, 670.
- D. Cement:
1. Insulating Cement: ASTM C195, asbestos free.
 2. Finishing Cement: ASTM C449/C449M.
- E. Reinforcing Membrane:
1. Polyester Cloth: 8 x 8 mesh per sq. in., 0.7 oz. per sq. yd.; Foster Products Division, Mast-a-fab.
 2. Glass Yarn Cloth: 20 x 20 mesh per sq. in.; Johns-Manville, Duramesh fabric.
- F. Sealing Tape: Vapor barrier, color matching, of same material as the pipe or fitting cover to which applied; as manufactured by Arno Inc., Compac Corp., Fasson Adhesive Co.; or as recommended by the manufacturer of the jacket material to which applied.
- G. Banding Wire: Steel, 20 gauge, galvanized; annealed.
- H. Thumb Tack Fastener: Stainless steel, with serrated shank.
- I. Insulation Inserts (for Hangers and Supports):
1. Inserts, High Density Insulation for use with Fibrous Glass Insulation:
 - a. Cold Service Piping:

- i. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
 - b. Hot Service Piping:
 - i. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
 - ii. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
- 3. Inserts for use with Elastomeric Foam Insulation only:
 - a. Cold and Hot Service Piping:
 - i. Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.
- J. Wood Blocks: Hardwood, preservative treated; 1" wide, 3" minimum length; inner and outer surfaces contoured to fit the curvature of the pipe, and insulation shield. Wood blocking is not acceptable for use on heating systems with fiberglass insulation, and will require removal if used.
- K. Wood Dowel Plugs: Hard wood, preservative treated.
- L. Wood Preservative: Pentachlorophenol, 5% solution, 3 minute dip.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not install insulation until the piping Work has been tested and accepted.
- B. Clean and dry all Work to be insulated prior to applying insulation.

3.02 INSTALLATION, GENERAL

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, except as specified otherwise.

3.03 INSTALLATION OF FIBERGLASS INSULATION

- A. Seal jacket longitudinal flap with vapor barrier jacket adhesive. Rub out all wrinkles and smooth excess sealant flush with outer surface of jacket.
- B. Apply a coating of vapor barrier jacket adhesive to butt ends of each section of insulation to be joined, and apply butt strips in like manner as above. Apply butt strips to overlap 1-1/2" on each side of the sections joined.
- C. PVC/Fiberglass Fitting Insulation: Tuck the ends of the pre-cut insulation batt snugly into the throat of the fitting, tuft and tuck-in the edges adjacent to the pipe insulation. Install fitting cover and seal as follows:
 - 1. Cold Service Insulation: Seal the overlap in the throat of the fitting cover, and the butt joint of the cover with the adjacent pipe insulation, with vapor barrier mastic and 2" wide sealing tape (a product of the fitting cover manufacturer).

- Extend the tape 1" over the adjacent pipe insulation and overlap upon itself at least 2" on the downward side.
2. Hot Service Insulation: Secure the cover with staples, thumb tack fasteners, or sealing tape.
- D. Pre-Molded and Miter Cut Fitting Insulation: Insulate to the same thickness as the adjoining pipe insulation. Apply joint sealant to the mating edges of the sections, and to the butt joint. Secure sections together with banding wire; bend twisted ends into the insulation. Apply a leveling coat of insulating cement to fill the voids and smooth irregularities.
1. Cold Service Insulation: Cover fitting insulation with two 1/8" thick applications of vapor barrier coating, with a layer of reinforcing membrane bedded between coats. Lap membrane at least 2" over itself, and the adjacent pipe insulation. Apply a 6 ounce canvas jacket over the fitting, secured with adhesive. Lap canvas at least 2" over itself, and the adjacent pipe insulation.
 - a. Omit canvas on concealed installations.
 2. Hot Service Insulation: Apply a 6 ounce canvas jacket to the fitting insulation, secured with adhesive. Lap canvas at least 2" over itself.
 - a. Omit canvas on concealed installations.
- E. Vapor Stop for Cold Service Insulation:
1. Pipe Insulation: At 21 foot intervals of horizontal, and 9 foot intervals of vertical pipe insulation, also at each fitting insulated with pre-molded or miter cut fitting insulation, apply a 1/16" thickness of vapor barrier coating to the butt end, and 2" into the bore of each joining section before assembling.
 2. Insulation Termination; Metal to Insulation Joints; Protrusions Through Insulation:
 - a. Apply a vapor barrier coating to completely seal the joint and extend over adjacent insulation and metal a maximum of 3 inches.
 - b. Embed reinforcing membrane into the coating, covering the complete coated surface; smooth out wrinkles.
 - c. Apply a heavy application of vapor barrier coating over the entire surface, leaving a large bead or fillet at the joint between metal and insulation.
- G. Insulated Piping installed exterior to the building, exposed to the elements:
1. Pipe supports shall not be in direct contact with pipe, supports must to the exterior of the insulation and jacketing.
 2. Provide continuous pipe and fitting jacketing, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).
 3. Provide continuous Waterproof Membrane jacketing on insulated pipe and fittings with insulation OD is 6" or larger, from exit point of building to termination point (to include termination connections).

3.04 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

- A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and install; re-seal with adhesive, making sure the mating surfaces are completely joined.
- B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
 - 1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation.
- C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.
- D. Insulated Piping installed exterior to the building, exposed to the elements:
 - 1. Pipe supports shall not be in direct contact with pipe, supports must to the exterior of the insulation and jacketing.
 - 2. Apply two coats of weatherproof mastic, on piping where the insulation OD is 3" or less.
 - 3. Provide continuous PVC pipe and fitting jacketing on piping where the insulation OD is 4" or larger, caulked / sealed weather tight, from exit point of building to termination point (to include termination connections).
 - 4. Provide continuous Waterproof Membrane jacketing on insulated pipe and fittings with insulation OD is 6" or larger, from exit point of building to termination point (to include termination connections).

3.05 INSTALLATION AT HANGERS

- A. Reset and realign hangers and supports if they are displaced while installing the piping insulation.
- B. Direct hanger or clamp contact of pipe for hot or cold piping is not allowed.
- C. Fiberglass Insulation: Install high density insulation filler pieces, at all points of support, between pipe insulation shields and pipe or tubing on pipe or tubing 2" and larger. Do not install high-density insulation filler pieces on piping or tubing scheduled to have steel saddles. Install filler pieces of the same thicknesses as adjoining pipe insulation and 2" longer than the insulation shield of the following materials:
 - 1. Install high density molded polyurethane or high-density polystyrene filler pieces, for pipe or tubing insulated with fibrous glass.

- D. Flexible Elastomeric Foam Insulation: Install wood blocking or wood dowel plug filler pieces of the same thickness as the insulation. Slot the insulation, insert the filler pieces between the pipe and insulation shield, and secure in place with adhesive. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1½"	2 dowel plugs	6 o'clock; in tandem
2" thru 4"	1 block 2 dowel plugs	6 o'clock, and 4&8 o'clock, respectively
6" thru 8"	2 blocks 4 dowel plugs	6 o'clock; in tandem and 4&8 o'clock; in tandem

3.06 INSULATION SCHEDULES

- A. General: Provide insulation as scheduled below, insulate all HVAC systems provided in this project in compliance with NYS Energy Code. Where the insulation scheduled or noted in the construction documents exceeds the Energy Code, the greater requirement shall be provided. HVAC Systems provided require insulation per the Energy Code, but not indicated in the schedule below, shall be insulated as part of this project..

APPLICATION	PIPE SIZE	TYPE	MINIMUM THICKNESS	ADD'L
Hot Water (HWS & HWR)	1-1/4" or less	A	1½"	
	1-1/2" and above	A	2"	
Glycol Water (GSW & GSR)	1-1/4" or less	A	1½"	
	1-1/2" and above	A	2"	
Chilled Water (CWS & CWR)	1-1/4" or less	A or B	½"	
	1-1/2" and above	A or B	1"	
Condensate Drain (CD)	1-1/4" or less	A or B	1/2"	
	1-1/2" and above	A or B	1"	
Refrigerant	1-1/4" or less	B	1½"	
	1-1/2" and above	B	2"	
Cold Services: Equipment, vessels and appurtenances for conveying, storing or processing materials, at or below ambient temperature	All	A or B	1½"	
Hot Services: Equipment, vessels and appurtenances for conveying, storing or processing	All	A or B	1½"	

materials, at or above ambient temperature				

Insulate all cold and hot service equipment in accordance with the schedule, except the items listed below:

- A. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves; back pressure valves.
 - B. Flexible connectors.
 - C. Piping buried in the ground, unless otherwise specified herein.
 - D. Items installed by others, unless otherwise specified herein.
- B. Install all cold and hot service insulation intact through pipe sleeves, and openings in building construction, maintaining the vapor barrier integrity of the system.
- C. Insulate valve bodies up to but not including the packing nuts.
- D. Flanges and mechanical couplings and fittings (grooved fittings) shall be insulated with the insulation thickness specified for that system. Provide molded PVC fitting on all grooved fittings.
- E. Coordinate with the equipment manufacturers requirements, provide field insulated equipment components or system components as recommended (IE: refrigerant line, boiler headers, cross over piping, etc) per manufacturer.
- F. Insulation Options: Select only one of the first 3 options for fiberglass pipe and/or equipment insulation. Option 4 may be used for temperatures to 200 degrees F and on sizes of 2 inches and under. Use fiberglass on pipe and equipment sizes of 2-1/2 inches and larger. Do not inter mix insulation types on individual runs of piping.
 - 1. Option 1: Fiberglass pipe and/or equipment insulation, with pre-molded fitting insulation.
 - 2. Option 2: Fiberglass pipe and/or equipment insulation, with PVC/fiberglass fitting insulating system.
 - 3. Option 3: Fiberglass pipe and/or equipment insulation, with miter cut fitting insulation.
 - 4. Option 4: Flexible elastomeric foam pipe and/or equipment insulation, with miter cut fitting insulation.

3.01 FIELD QUALITY CONTROL

- A. Field Samples: The Owner may at their discretion, take field samples of installed insulation for the purpose of checking materials and application. Re-insulate sample cut areas.

END OF SECTION 230719

SECTION 230720**BREECHING INSULATION****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

Breeching: Section 235100.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
 - 1. Insulation Materials.
- B. Samples:
 - 1. Preformed Pipe Insulation: 3 inches long for 1 inch ips pipe, and molded pipe fitting covering sample.
 - 2. Block, Board or Blanket Insulation: 6 x 6 inch sample.
 - 3. High Density Duct Insulation Filler Pieces: 6 x 6 inch sample.
 - 4. Jacketing Materials: Approximately 1 sq ft of each (where factory applied jackets are to be used, insulation sample to include jacket).
 - 5. Tapes: Manufacturer's sample roll.
 - 6. Metal Jackets: 3 inch long sample with stainless steel band wrenched in place.
- C. Quality Control Submittals:
 - 1. Installers Qualification Data:
 - a. Name of each person who will be performing the Work.
 - b. Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.

1.04 QUALITY ASSURANCE

- A. Qualifications: The persons employed to perform the Work of this Section and their supervisor shall be personally experienced in mechanical insulation work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of mechanical insulation.
- B. Regulatory Requirements: Fire and Smoke Hazard Classification Rating - ASTM E-84: Duct Insulation installed inside buildings, including duct lining materials, laminated jackets, mastics, sealants and adhesives:

1. Flame Spread: 25 or less.
2. Smoke Developed: 50 or less.

PART 2 PRODUCTS

2.01 INSULATION SHAPES

- A. Board: Preformed, flat, rectangular rigid material, a minimum of 6" wide by 18" long, of thickness as specified, generally used to insulate ductwork.
- B. Block: Preformed, flat or curved rectangular rigid material, not larger than 18" x wide by 36" long of thickness as specified, generally used to insulate equipment.

2.02 INSULATION MATERIALS

- A. Fibrous Glass: Glass processed from a molten state into fibrous form bonded together with or without the addition of binder to form a rigid, semi-rigid or flexible insulation material with the following physical properties:
 1. Sectional Pipe Insulation (High Temperature - HT): Minimum density of 3 pcf, thermal conductivity (k value at 300 degrees F.) of 0.47, conforming to Fed. Spec. HH-I-558B, Form D, Type III, Class 13.
 2. Board Insulation (High Temperature - HT): Thermal conductivity (k value at 300 degrees F.) of 0.42", conforming to Fed Spec. HH-I-558 B, Form A, Class 3.
- B. Mineral Wool: Rock, slag or glass processed from a molten state into fibrous form, with or without the addition of a binder to form a rigid, semi-rigid or flexible high temperature insulation material with the following physical characteristics:
 1. Block or Board Insulation (High Temperature - HT): Density of 12 pcf, thermal conductivity (k value at 300 degrees F.) of 0.42, conforming to Fed. Spec. HH-I-558B, Form A, Class 3.
- C. Insulating Cements: Compatible with the insulating material being utilized, equal in thickness to the adjoining insulation, but in no case less than 3/4" thick, cement-applied in layers of not more than 1/2" thickness; each layer shall dry before succeeding layer is applied.
 1. 85% Magnesia Cement: ASTM C193.
 2. Mineral Wool Cement: ASTM C195.
- D. Finishing Cement: Composition of an insulating cement, a hydraulic air setting cement and other ingredients in accordance with the insulating cement manufacturer's recommendation. Finishing cement shall form a hard finishing and protective cover on breeching, at least 1/2" thick applied in two layers with the final coat troweled to a smooth finish.

2.03 JACKET MATERIALS

- A. Metal Jackets:

1. Roll Type Jacketing: Type 3003 or 5005 H14 temper pure specification aluminum alloy, a minimum of 0.016" thick with 3/16" deep corrugations, with a heat laminated polykraft moisture barrier backing. Provide fastening devices consisting of aluminum sheet metal screws, 0.020" thick by 1/2" wide stainless steel bands and 0.032" thick stainless steel wing type seals.

2.04 MISCELLANEOUS MATERIALS

A. Wiring, Banding and Fastening Devices:

1. Binding or Lacing Wire: Nickel copper alloy or copper clad steel a minimum of 16 gage, unless otherwise specified.

PART 3 EXECUTION

3.01 INSULATING SMOKE BREECHING AND SMOKE FLUES

- A. Insulate all exterior surfaces of smoke breeching connected to oil or gas fired low pressure steam boilers, low pressure heating hot water boilers, domestic hot water heaters and incinerators with 2" thick high temperature (HT) fibrous glass or high temperature (HT) mineral wool block or board insulation, secured in place with wire or galvanized steel bands. For small areas secure insulation with 16 gage wire on maximum 6" centers and for large areas with 14 gage wire or .015" thick by 1/2" wide galvanized steel bands on maximum 10" center. Stagger insulation joints. On irregular surfaces, where the application of block or board insulation is not practical, insulate with insulating cement built-up to the same thickness as the adjoining insulation. Fill all joints, voids and irregular surfaces with insulating cement, to provide a uniform insulation thickness.
- B. Install 0.016" thick 3/16" deep corrugated aluminum jacketing over all insulated surfaces. Lap longitudinal and circumferential joints a minimum of 2". Secure jacketing in place with 1/2" by 0.020" thick stainless steel bands and stainless steel wing type seals, on maximum 12" centers. Terminate all exposed ends of insulation with insulating cement trowelled down to metal surface on a bevel.
- C. Insulate all exterior surfaces of the smoke breeching, induced draft fans and gas uptake ducts from medium and high pressure steam boilers and high temperature water boilers to the breeching, and any portion of the gas outlet outside the boiler brickwork, as shown on the drawings.

3.02 SCHEDULE OF ITEMS NOT TO BE INSULATED

- A. Do not insulate the following smoke breeching and smoke flue piping:
 1. Factory fabricated insulated smoke flue pipe and smoke stacks.
 2. Induced draft fans installed in low pressure steam or heating hot water boiler smoke flue piping or smoke breeching.
- B. Do not insulate items installed under other Contracts.

END OF SECTION 235133

SECTION 230800 COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. OPR and BoD documentation are included by reference for information only.

1.2 SUMMARY

- A. This section includes general requirements that apply to implementation of the commissioning process without regard to specific systems, assemblies, and components.
- B. Related Sections including the following:
 - 1. Division 22 Section "Commissioning of Plumbing" for commissioning process activities for plumbing systems, assemblies, equipment, and components.
 - 2. Division 26 Section "Commissioning of Electrical" for commissioning process activities for electrical systems, assemblies, equipment and components.

1.3 DEFINITIONS

- A. BoD: Basis of Design. A document, prepared by Architect, that record concepts, calculations, decisions, and product selection used to meet the OPR and to satisfy applicable regulator requirements, standard and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document, prepared by CxA, that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document, prepared by Owner that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- E. Systems, Assemblies, Equipment and Components: Where these terms are used together or separately, they shall mean "as-built" systems, assemblies,

equipment and components.

1.4 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
 - 1. CxA: An entity identified by the Owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Architect and engineering design professionals.

1.5 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documents to the CxA and each Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documents, prepared by Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor and their subcontractors shall assign representatives with expertise and authority to act on their behalf and schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 2. Cooperate with the CxA for resolution of issues recorded in "Issues Log."
 - 3. Attend and participate in commissioning team meetings held on a variable basis.
 - 4. Integrate and coordinate commissioning process activities with construction schedule.
 - 5. Review and accept construction checklist provided by the commissioning authority.
 - 6. Complete paper or electronic construction checklists as Work is completed and provide to the commissioning authority on a monthly

- basis.
- 7. Review and accept commissioning process test procedures provided by the commissioning authority.
- 8. Accomplish commissioning process test procedures.

1.7 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process test procedures.
- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, CxA will report the failure in the "Issue Log."
- F. Prepare and maintain issues log.
- G. Prepare and maintain completed construction checklist log.
- H. Witness systems, assemblies, equipment, and component startup.
- I. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning process report.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 SYSTEMS TO BE COMMISSIONED

- A. Systems to be commissioned shall include, but not limited to the following systems and equipment. Contractor shall coordinate with the commissioning agents Cx plan for a complete list of systems and equipment.
 - 1. Mechanical Systems
 - a. Air Handling Systems
 - b. Dehumidification Systems
 - c. Heating Hot Water Systems
 - d. Chilled Water Systems
 - 2. Automatic Temperature Controls

END OF SECTION 230800

SECTION 230993**SEQUENCE OF OPERATIONS FOR HVAC CONTROLS****PART 1 - GENERAL****1.01 SUMMARY**

- A. This section includes control sequences for HVAC equipment.
- B. Provide labor, materials, tools, machinery, equipment, and services necessary to satisfy the sequence of operations specified herein. Coordinate the work with other trades to ensure complete operations of the controls system.
- C. Comply with ASHRAE Standards 90.1 and 62.1 as referenced by the Current Code, as well as applicable requirements of the Building Code and other relevant codes.
- D. Control sequences shall conform to the requirements of ASHARE Guideline 36-2021 – High Performance Sequences of Operation for HVAC systems.

PART 2 – PRODUCTS (NOT APPLICABLE)**PART 3 – SEQUENCE OF OPERATION****3.01 GENERAL**

- A. For each system listed provide direct digital control to satisfy the sequence of operation as stated in this section.
- B. In addition to the requirements of this section, comply with ASHRAE Guideline 36. Provide devices that are pre-programmed with Guideline 36 sequences where available including the following:
 - 1. Air handling systems
 - 2. Heating hot water plants.
 - 3. Chilled water plants.
 - 4. Fan coil units.
- C. Power Fail/Auto Restart
 - 1. Upon the restoration of power following a power loss, the energy management control system (EMS) shall analyze the status of all controlled equipment, compare it with normal programmed scheduling and turn equipment on or off as necessary to resume normal operations.
 - 2. The EMS shall provide an orderly, staggered and predefined scheduling of return-to-normal operation of controlled equipment. The order in which equipment (or groups of equipment) is started, along with the time delay between starts, shall be user definable.
- D. Fire Alarm Shut Down: In an alarm condition, the Fire Alarm system shall shut down fans through direct interlock. The EMS shall not shut down the fans. The EMS contractor shall ensure that dampers and valves position to their fail-safe

positions.

- E. All suggested setpoints and settings shall be adjustable.
- F. Provide lockable, tamper-proof, clear plastic protective guards on all room temperature sensors and thermostats located in public spaces (vestibules, corridors, locker rooms, auditoriums, kitchens, cafeterias, etc.). Provide temperature sensors installed under flush mounted protective plates in bathrooms. Provide metal protective guards on all room temperature sensors and thermostats located in gymnasiums, mechanical equipment rooms, shipping and receiving areas, etc. (except for wireless sensors which shall use impact-resistant plastic guards).
- G. For all analog measurements provide high and low limit and fault alarm indication. For all fans, pumps, etc., provide status alarm indication.
- H. Provide indication of system modes: i.e., Occupied, Unoccupied, Warmup, Cooldown, Pre-Occupancy Purge, Post Occupancy Flush, etc. Differentiate as appropriate for all systems controlled or interfaced to.
- I. All analog, binary and time variables and point information and adjustments shall be accessible via the OWS, web browser, etc.
- J. All adjustment and acknowledgment permissions shall be password-level dependent.
- K. Wherever variable speed operation for a motor is specified or required to satisfy the sequence of operations, provide motors and controls capable of variable speed operation. Provide electronically commutated motors (ECM) where available or when ECMs are not an option due to lack of availability of motor size, provide NEMA premium, inverter duty motors with variable frequency drives.
- L. Replace existing controls, thermostats, actuators, etc., with new devices as necessary for incorporation into the new EMS control system.

3.02 HOT WATER HEATING SYSTEM

- A. Heating
 - 1. The system shall be manually enabled for continuous operation through the EMS. The lead boiler circulating pump shall start. Once the pump has started, its associated boiler operation shall be enabled through hardwire interlock to the boiler firing circuit. The boiler shall operate under self-contained control to maintain its hot water setpoint of 180°F.
 - 2. The EMS shall sense the common boiler hot water supply temperature. If the operating boiler is unable to maintain the hot water setpoint of 180°F, the EMS shall start the standby boiler pump. Once the pump has started, its associated boiler operation shall be enabled through hardwire interlock to the boiler firing circuit. The boiler shall operate under self-contained control to maintain its hot water setpoint of 180°F.
 - 3. The EMS shall use current sensors to confirm the pumps are in the commanded state (i.e., on or off) and generate an alarm if status deviates

- from the EMS start/stop command.
4. The EMS system shall monitor the boiler controls for a common alarm condition (i.e. low water cut off, flame failure, etc.), and generate an alarm on the EMS.
 5. The EMS system shall generate an alarm when the water temperature is outside the minimums or maximums as required by the boiler manufacturer (i.e. differential temperature too large or too small, return or supply temperature too low, etc.).
 6. The lead boiler and its circulating pump shall rotate on a weekly basis.
 7. Interface with emergency boiler break glass shutdown switches shown on drawings. Switches shall de-energize all fuel burning equipment in boiler room (boilers and domestic water heaters). The EMS system shall generate an alarm when the switches are in the "Off" position. The EMS system shall also generate an alarm when the existing shutdown switches are in the "Off" position.
- B. When heating is enabled the lead building hot water supply pump shall start. The EMS shall sense the system differential pressure at a remote point in the system and vary the speed of the operating pump via its associated Variable frequency drive to maintain the adjustable system differential setpoint.
- C. The EMS shall sense the building hot water supply temperature and modulate the 3-way control valve to maintain the supply water temperature as reset according to the following schedule:

OUTSIDE AIR TEMPERATURE	HOT WATER SUPPLY TEMPERATURE
below 35°F	180°F
Above 50°F	140°F

- D. The lead pump shall rotate on a weekly basis. If the operating pump fails, an alarm shall be generated, the pump disabled and the standby pump shall start.
- E. The EMS shall use current sensors to confirm the pumps are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command.

F. Point List

1. Boiler B-3 start/stop command
2. Boiler B-3 circulating pumps (HWP-8/HWP-9) start/stop command
3. Boiler B-3 circulating pumps (HWP-8/HWP-9) status command
4. Boiler B-3 common alarm condition
5. Boiler B-4 start/stop command
6. Boiler B-4 circulating pumps (HWP-10/HWP-11) start/stop command
7. Boiler B-4 circulating pumps (HWP-10/HWP-11) status command
8. Boiler B-4 common alarm condition
9. Heating loop pumps (HWP-4/HWP-5) start/stop command
10. Heating loop pump (HWP-4/HWP-5) status
11. Heating loop pump (HWP-6/HWP-7) start/stop command
12. Heating loop pump (HWP-6/HWP-7) status
13. Outside air temperature (designated as system master)

14. Boiler B-3 HWS temperature
15. Boiler B-4 HWS temperature
16. Heating loop HWS temperature
17. Heating loop HWR temperature
18. Heating loop valve position command
19. Heating loop valve position feedback
20. Emergency burner shutdown alarm (for each switch)

3.03 HOT WATER TO GLYCOL HEAT EXCHANGER

- A. The system shall be manually enabled for continuous operation through the EMS. The lead circulating pump shall start. The control valve shall modulate to maintain its hot glycol supply setpoint of 180°F.
- B. The EMS shall sense the system differential pressure at a remote point in the system and vary the speed of the operating pump via its associated variable frequency drive to maintain the adjustable system differential setpoint.
- C. The EMS shall sense the building hot glycol supply temperature and modulate the control valve to maintain the supply water temperature as reset according to the following schedule:

OUTSIDE AIR TEMPERATURE	HOT GLYCOL SUPPLY TEMPERATURE
below 35°F	180°F
Above 50°F	140°F

- D. The lead pump shall rotate on a weekly basis. If the operating pump fails, an alarm shall be generated, the pump disabled and the standby pump shall start.
- E. The EMS shall use current sensors to confirm the pumps are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command.
- F. Point List
 1. Pump P-3 start/stop command
 2. Pump P-3 status
 3. Pump P-4 start/stop command
 4. Pump P-4 status
 5. Outside air temperature (designated as system master)
 6. HGS temperature
 7. HGR temperature
 8. Heating loop valve position command
 9. Heating loop valve position feedback

3.04 COMBUSTION AIR CONTROL

- A. Whenever Emergency Generator indexes to fire, the motorized combustion air damper shall open and the Emergency Generator shall be allowed to fire through hardwired interlock with a damper limit switch sensing damper blade position.

3.05 BOILER ROOM TEMPERATURE CONTROL

- A. When the boiler room space temperature drops below the 65°F occupied or 55°F unoccupied heating setpoint as sensed by a wall mounted sensor, the EMS shall open the hot water control valve and cycle the unit heater fan as necessary to maintain its setpoint. Provide an aquastat to prevent fan operation if the hot water supply temperature at the unit drops below 110°F.
- B. When the boiler room space temperature rises above the 78°F cooling setpoint, the motorized damper at the gravity relief vent shall open. If not already operating for combustion air, the combustion air damper shall open to provide ventilation air to the space.
- C. Point List
 - 1. Space temperature
 - 2. Control valve position command
 - 3. Unit heater start/stop command
 - 4. Combustion air damper command
 - 5. Relief vent damper command

3.06 GYMNASIUM UNIT AHU

- A. The AHU is a heating, cooling and ventilating unit with supply fan with variable frequency drive, filter mixing box, economizer dampers, primary heat pump heating and secondary hot water/glycol heating coil with 2-way control valve and chilled water cooling coil with 2-way control valve. Relief dampers shall be interlocked with the unit. A wall-mounted space temperature sensor with override button (limit 2 hour reset) and guard shall be mounted on each side of the gymnasium as shown on the drawings. A wall-mounted space CO2 sensor with guard shall be mounted on each side of the gymnasium adjacent to the space temperature sensor.
- B. Whenever the unit operates the fan shall run at its design speed as determined by the balancing contractor.
- C. The EMS shall use a current sensor to confirm the fan is in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command. Should the fan fail in its operation the unit operation shall be disabled.

Pre-Occupancy purge: The Optimal Start-Stop control algorithm shall automatically determine the amount of early start-time required to have the average of the two space temperatures at set point when occupied mode begins. Thirty minutes prior to the start of either the OSS calculated warm-up or cooldown mode or occupied mode if optimal start is not required, the EMS shall start the unit and slowly ramp the outside, return and relief air dampers to the maximum occupant load outdoor air position. The dampers shall position slowly enough that the low limit thermostat will not shutdown the unit. The EMS shall modulate the heating and cooling control valves in sequence as necessary to

maintain the discharge air temperature as reset from 55°F-95°F as the average space temperature varies from its unoccupied heating set point of 62°F or unoccupied cooling setpoint of 78°F.

- D. WATER COIL FREEZE PROTECTION- HOT WATER VALVE SHALL ALWAYS MAINTAIN 5-8% FLOW, IF SYSTEM IS NOT GLYCOL MIX.
- E. CONDENSER DEFROST MODE – WHEN CONDENSER GOES INTO DEFROST MODE, HOT WATER VALVE SHALL OPEN AND MAINTAIN ROOM TEMPERATURE SETPOINT. SYSTEM SHALL GO BACK TO NORMAL OPERATION WHEN DEFROST MODE IS COMPLETE
- E. Warm-up/Cooldown Mode: After the pre-occupancy purge mode the economizer and relief dampers shall be positioned to the minimum outdoor air position. For warm-up mode, the heating pump modulate (hot water coil heating is to secondary) to maintain the supply air temperature as reset from 55°F-95°F as the average space temperature varies from the occupied set point of 72°F. For cooldown mode, if the supply air temperature is above its set point with the heating control valve closed and the outside air enthalpy is less than the return air enthalpy, the economizer and relief dampers and cooling control valve shall modulate in sequence to maintain the discharge set point. If the outside air enthalpy is greater than the return air enthalpy and DX is available, the economizer and relief dampers shall be positioned to the minimum outdoor air position and the cooling control valve shall modulate to maintain the supply air temperature at set point.
- F. Occupied Mode: The unit fan shall run continuously during occupied periods. The outside air damper shall initially position to its minimum position. The supply air temperature set point shall be reset from 55°F-95°F as the average space temperature varies from its occupied set point of 72°F. The EMS shall modulate the heat pump (hot water coil is secondary)as required to maintain the supply air temperature at set point. Upon a rise in supply air temperature above its set point, the heating valve shall modulate closed. On a continued rise in supply air temperature and if the outside air enthalpy is less than the return air enthalpy, the economizer and relief dampers and cooling control valve shall modulate in sequence to maintain the discharge set point. If the outside air enthalpy is greater than the return air enthalpy and chilled water is available, the dampers shall be returned to the minimum outdoor air position and the cooling coil valve shall be modulated to maintain the discharge air set point.
- G. CONDENSER DEFROST MODE – WHEN CONDENSER GOES INTO DEFROST MODE, HOT WATER VALVE SHALL IS TO OPEN AND MAINTAIN ROOM TEMPERATURE SETPOINT. SYSTEM SHALL GO BACK TO NORMAL OPERATION WHEN DEFROST MODE IS COMPLETE.
- H. As the higher of the Gymnasium CO2 levels varies from 100 ppm greater than the outside air to the full occupied level of 700 ppm greater than the outside air level, the EMS shall override supply air temperature control and modulate the economizer and relief dampers as necessary from their current position to the maximum occupant load outdoor air position. The position of the dampers

relative to outdoor air shall be the greater of that required by either the temperature control or the CO2 level control. The heating and cooling coil control valves shall modulate in sequence to maintain the supply air temperature at set point as reset from 55°F-95°F as the average space temperature varies from its occupied set point of 72°F.

- I. Post-occupancy flush: At the end of the occupied period if the higher Gymnasium CO2 level is above the outside air level, the economizer and relief dampers shall position to the maximum occupant load outdoor air position and the unit shall run until the CO2 level is reduced to outside air level, prior to shutting down. The heating and cooling coil control valves shall modulate in sequence as necessary to maintain the discharge air temperature as reset from 55°F-80°F as the space temperature varies from its occupied set point of 72°F.
- J. Unoccupied Mode: The unit shall be off. The outside and relief air dampers and cooling coil control valve shall be closed. The return air damper and heating coil valve shall be open. If the lower space temperature drops below the night set back set point of 62°F, the unit shall start and run on full heating until the space temperature rises 2°F above the night set back set point. The unit can be placed into the occupied mode of operation for up to a 2-hour period of time by depressing the button on the face of either of the space temperature sensors. This override can be canceled by depressing the button again.
- K. The EMS contractor shall provide and install the outdoor and gymnasium CO2 level sensors where shown on the drawings. At the start of the warranty period, the contractor shall ensure the sensors are properly calibrated and demonstrate that the target ventilation rates are being met. At the 6-month midpoint and the 12-month conclusion of the warranty period, the EMS contractor shall re-calibrate the sensors and test the system to ensure the target ventilation rates are still being met. Provide documentation indicating results to owner.
- L. Gymnasium and outdoor air CO2 levels shall be recorded by the EMS system at not greater than 15-minute intervals. Records of CO2 levels shall be kept for a minimum of three years.
- M. There is no provision to remove CO2 by any method other than dilution.
- N. Above its setting, a differential pressure switch shall signal a dirty filter alarm condition to the EMS.
- O. Provide a low limit thermostat serpentine across the downstream face of the unit heating coil. If the air temperature as sensed by the thermostat drops below its setpoint of 38°F, the unit fan shall be de-energized and the alarm condition indicated at the EMS. The heating and cooling coil control valves shall open.
- P. Smoke detectors in the unit supply and return air streams shall signal an alarm condition to the building fire alarm system upon activation. The fire alarm system shall stop the unit. The alarm condition shall be indicated at the EMS.
- Q. Whenever the unit is off the outside and relief air dampers shall be closed. The return air damper and heating coil control valve shall be open. The cooling coil control valve shall be closed except in a low limit alarm condition as described

above.

R. Point List

- a. Space temperature (typical 2)
- b. Space sensor unoccupied override command status (typical 2)
- c. Outdoor air CO2 level
- d. Space CO2 level (typical 2)
- e. Supply fan VFD start/stop command
- f. Supply fan status
- g. Heating valve position command
- h. Heating valve position feedback
- i. Cooling valve position command
- j. Cooling valve position feedback
- k. Outside, return & relief dampers position command (each damper)
- l. Outside, return & relief dampers position feedback (each damper)
- m. Mixed air temperature
- n. Heating coil discharge air temperature
- o. Unit discharge air temperature
- p. Outdoor air temperature
- q. Outdoor air humidity
- r. Return air temperature
- s. Return air humidity
- t. Low limit thermostat alarm
- u. Dirty filter alarm
- v. Supply air smoke detector alarm
- w. Return air smoke detector alarm

UNOCCUPIED

HEATING- OUTSIDE DAMPERS ARE CLOSED. HEAT PUMPS MAINTAIN UNOCCUPIED ROOM TEMPATURE SETTING. IF ROOM TEMPERATURE FALL 10 DEGREES BELOW TEMPERATURE SET POINT, HOT WATER VALVE IS TO OPEN AND MODULATE TO MANTAIN SET POINT, HEAT PUMPS ARE TO REMAIN ON. AFTER 4 HOURS THE SYSTEM WILL RESET AND THE HEAT PUMP WILL TAKE OVER MAINTAINING HEATING THE SPACE AND THE SEQUENCE WILL START AGAIN.

WATER COIL FREEZE PROTECTION- HOT WATER VALVE SHALL ALWAYS MAINTAIN 5-8% FLOW, IF SYSTEM IS NOT GLYCOL MIX.

CONDENSER DEFROST MODE – WHEN CONDENSER GOES INTO DEFROST MODE, HOT WATER VALVE SHALL OPEN AND MAINTAIN ROOM TEMPERATURE SETPOINT. SYSTEM SHALL GO BACK TO NORMAL OPERATION WHEN DEFROST MODE IS COMPLETE.

COOLING – OUTSIDE DAMPERS ARE CLOSED. AC-DX SYSEM WILL MAINTAIN UNOCCUPIED SPACE AT ROOM TEMPATURE SETTING.

A. OCCUPIED

HEATING- INITIAL WARM UP – 1 HOUR BEFORE OCCUPANCY, OUTSIDE AIR DAMPERS SHALL OPEN AND CORRESPONDING EXHAUST SYSTEM

SHALL TURN ON. HEAT PUMPS SHALL START AND MAINTAIN OCCUPIED ROOM TEMPERATURE SET POINT. SIMULTANEOUSLY, HOT WATER VALVES SHALL OPEN AND MAINTAIN ROOM TEMPERATURE SET POINT. UPON INITIAL ROOM TEMPERATURE SET POINT, HOT WATER VALVES SHALL CLOSE AND HEAT PUMPS ARE TO MAINTAIN ROOM TEMPERATURE SETPOINT.

HEATING – OUTSIDE DAMPERS ARE OPEN AND EXHAUST SYSTEM SHALL TURN ON. HEAT PUMPS MAINTAIN UNOCCUPIED ROOM TEMPERATURE SETTING. IF ROOM TEMPERATURE FALLS 5 DEGREES BELOW TEMPERATURE SET POINT, HOT WATER VALVE IS TO OPEN AND MODULATE TO MAINTAIN SET POINT, HEAT PUMPS ARE TO REMAIN ON. AFTER 4 HOURS THE SYSTEM WILL RESET AND THE HEAT PUMP WILL TAKE OVER MAINTAINING HEATING THE SPACE AND THE SEQUENCE WILL START AGAIN.

UPON SATISFYING ROOM TEMPERATURE SET POINT, OUTSIDE AIR DAMPERS ARE OPEN, HEAT PUMPS SHALL TEMP OUTSIDE AIR TO 55°F ALL TIME.

WATER COIL FREEZE PROTECTION- HOT WATER VALVE SHALL ALWAYS MAINTAIN 5-8% FLOW, IF SYSTEM IS NOT GLYCOL MIX.

CONDENSER DEFROST MODE – WHEN CONDENSER GOES INTO DEFROST MODE, HOT WATER VALVE SHALL IS TO OPEN AND MAINTAIN ROOM TEMPERATURE SETPOINT. SYSTEM SHALL GO BACK TO NORMAL OPERATION WHEN DEFROST MODE IS COMPLETE.

COOLING – INITIAL COOL-OFF – 1 HOUR BEFORE OCCUPANCY, OUTSIDE AIR DAMPERS SHALL OPEN AND CORRESPONDING EXHAUST SYSTEM SHALL TURN ON AC-DX SYSTEM SHALL START AND MAINTAIN OCCUPIED ROOM TEMPERATURE SET POINT.

COOLING – OUTSIDE DAMPERS ARE OPEN AND EXHAUST SYSTEM SHALL TURN ON. AC-DX SYSTEM MAINTAIN UNOCCUPIED ROOM TEMPERATURE SETTING.

UPON SATISFYING ROOM TEMPERATURE SET POINT, OUTSIDE AIR DAMPERS ARE OPEN, AC-DX SYSTEM SHALL TEMP OUTSIDE AIR TO 55°F ALL TIME.

3.07 HOT WATER/GLYCOL HEATING SYSTEM

A. Heating Control

1. When the outside air temperature is below 65°F (as sensed by shaded

sensor located on north wall of building at least 10 feet above grade) heating shall be enabled. The lead boiler circulating pump HWP-1, 2 or 3 shall start. Once the pump has started, its associated boiler operation shall be enabled through hardwired interlock.

2. Boilers shall be sequenced and hot water supply temperature reset to maintain the hot water supply to the building according to the following schedule:

OUTSIDE AIR
TEMPERATURE
below 35°F
above 50°F

GLYCOL
SUPPLY TEMPERATURE
180°F
140°F

3. Once the primary boiler has started on low fire it shall modulate to full capacity as necessary to maintain the hot water supply temperature. If the heating demand increases and the boiler is at full capacity and unable to maintain the hot water supply at setpoint, the secondary boiler and its circulating pump shall start per the sequence above. The primary boiler shall modulate down to 50% capacity as the secondary boiler modulates up to 50%. The boilers shall then operate in unison to satisfy the heating demand. When system demand decreases and both boilers have modulated to minimum in unison, the standby boiler and circulating pump shall stop and the primary boiler shall modulate to maintain the hot water at setpoint.
 4. Should the primary or secondary boiler fail in its operation the alarm condition shall be indicated at the OWS and the standby boiler and its circulating pump shall be used in place of the failed boiler.
 5. The three boilers shall rotate as primary, secondary and standby boilers on a weekly basis.
 6. The EMS shall use current sensors to confirm the pumps are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS start/stop command.
 7. The EMS system shall monitor the boiler controls for a common alarm condition (i.e. low water cut off, flame failure, etc.), and generate an alarm at the OWS.
 8. Emergency boiler shutdown switches are furnished, installed and wired by the boiler supplier as shown on drawings to shut-off the three boilers. The EMS system shall generate an alarm at the OWS when the switches are in the "Off" position.
- B. When heating is enabled the selected lead building hot water supply pump VSHWP-1 or VSHWP-2 shall start on low speed. The EMS shall sense the system differential pressure at a remote point in the system and vary the speed of the operating pump via its associated variable speed drive to maintain the adjustable system differential setpoint.
 - C. The lead pump shall rotate on a weekly basis. If the operating pump fails, an alarm shall be generated, the pump disabled and the standby pump shall start.
 - D. The EMS shall use current sensors to confirm the pumps are in the commanded state (i.e., on or off) and generate an alarm if status deviates from the EMS

start/stop command.

E. Point List

1. Outside air temperature (designated master sensor)
2. Outside air humidity (designated master sensor)
3. Hot water supply temperature (each boiler)
4. Hot water return temperature (each boiler)
5. Building hot water supply temperature
6. Building hot water return temperature
7. Boiler pump start/stop (each boiler)
8. Boiler pump status (each boiler)
9. Boiler capacity command (each boiler)
10. Boiler alarm condition (each boiler)
11. Emergency burner shutdown alarm (for each switch)
12. Building hot water pump VSD start/stop (each pump)
13. Building hot water pump status (each pump)
14. Building hot water pump VSD speed command (each pump)
15. Building hot water pump VSD fault alarm (each pump)
16. Hot water system differential pressure

3.08 CHILLED WATER/GLYCOL COOLING SYSTEM

1. The quantity of primary chilled water pumps shall be the quantity of chillers, allowing two primary pumps to function as a spare.
2. The number of primary chilled water pumps in operation shall depend on the number of chillers required to satisfy the cooling load, and any pump may be assigned to any chiller, as described below. The system is designed with two spare primary pumps. Changing pump/chiller associations on any operating chiller/pump shall be allowed (in the case of a failure or required servicing of the pumps).
3. The system is designed to allow for one of the primary pumps to be designated as a standby pump, with the remaining pumps to be available to operate with any chiller, with no one pump dedicated to any specific chiller. Pump assignment to an associated chiller shall be an automatic function, initiated at the chiller control panel and/or the pump control panel. Should any chiller fail while in operation, its associated isolation valve shall close, and an alarm shall be initiated at the network, and the next pre-selected chiller in the sequence shall start.
4. The primary chilled water supply header temperature sensor shall control the staging of the chillers to satisfy the primary chilled water temperature set point within +/- 2degF (adj) from 44 degF (adj) to 48 degF (adj).
5. The intent of the Carrier chiller factory OEM controller is to control the chilled water secondary loop pumps, monitor the secondary differential pressure sensor, control the secondary system bypass and monitor and alarm for system loop temperatures, etc. The chiller factory OEM control system shall be automatically enabled at chiller factory OEM controller and monitored at the BMS, the primary chilled water pumps shall be automatically enabled when cooling is called for and the on/off operation of the chilled water primary loop pumps shall be automatically accomplished.

6. Provide DDC (BACnet) signal connection to Carrier factory OEM furnished control package gateway with factory provided and integral BACnet Network communication port. Provide flow switches for each machine to prevent chiller from operating when chiller water is not flowing. The chiller shall be supplied with factory furnished controls.
7. The chiller factory OEM controls shall operate chillers on lead-lag, alternating each startup based on run time. The chiller factory OEM controller shall start and stop primary loop chilled water pumps on lead-lag, alternating each startup based on run time. Signal alarm if unit fails to start as commanded to the network via the chiller factory BACnet communication card.
8. The chiller factory OEM control system shall be seasonally manual enabled at the BACnet network server by the networked "Winter/Summer" switch. The BMS network shall monitor the status and position of the chiller Start/Stop switch and monitor all systems and setpoints. The seasonal on/off enabling of the primary chilled water loop pumps shall be accomplished by the networked "Winter/Summer" command from the BACnet network server. When a chiller is called to start by the chiller factory controls based on chilled water supply temperature it shall automatically, through time delay relays and start the equipment in the following sequences:
 - a. First, the lead chilled water primary pump shall be started and proven on by motor leg current switch indication, and then the lead chiller shall be selected by means of the chiller factory controller. If the lead chilled water primary pump's run indication via current switch is not proven to the chiller factory OEM controls, the chiller factory OEM controller shall start the lag primary loop pump. Next, the lead chiller shall be started including starting its condenser fans and then its compressors after opening the inlet isolation valve and receiving the flow indication from the discharge flow switch. The chiller factory OEM controls shall monitor end switches on the isolation valves and initiate the start of the lag chiller if the lead chiller isolation valve limit switch indication is not received.
 - b. If the lead chiller is not able to maintain the header leaving water temperature setpoint +/- 2degF (adj) and after a time interval of approximately 60 seconds to 20 minutes (adj), the start-up sequence of the lag chiller shall be enabled by the chiller factory OEM controller. First, the lag chilled water primary pump shall be started and proven on by motor leg current switch indication, then the lag chiller condenser fans and then its compressors after opening the inlet isolation valve and receiving the flow indication from the discharge flow switch. The chiller factory OEM controller shall monitor end switches on the isolation valves and initiate the start of the next lag chiller if the isolation valves limit switch indication is not received.
 - c. The quantity of primary pumps shall be the quantity of chillers but not less, allowing two standby pumps to function as spares.
 - d. The mechanical contractor installed PRV shall provide all make-up water functions.
 - e. Provide a chiller break-glass station as shown on the Drawings.
9. Chiller factory OEM controller with provided Chilled Water Secondary Loop Control:

- a. Each secondary pump will provide chilled water to the building. The chiller factory OEM controls shall start and stop secondary loop chilled water pumps on lead-lag, alternating each startup as a function of run time alternating each startup based on run time (7 days, adjustable). The secondary water pump's VFD shall be controlled by the chiller factory OEM controls system to maintain the desired differential pressure (DP) across the chilled water system. Chiller factory OEM controls shall start spare pump under shared differential pressure control prior to stopping running pump for a seamless transfer. The secondary water pump's VFD shall be controlled by the chiller factory OEM controller to maintain the desired differential pressure (DP) across the chilled water system. The lead pump is controlled to maintain the desired DP set point (___psi adjustable). The lag pump shall start when lead pump fails or as part of pump rotation logic.
- b. The spare pump shall automatically start in the event of a failure of the operating lead secondary pump.
- c. Secondary chilled water supply and return temperatures shall be monitored by sensors.
- d. A differential pressure transmitter measuring the main secondary supply and return line pressures of the chilled water system shall modulate the VFD on the variable speed secondary loop active pump. Secondary loop differential pressure reset logic shall be used to reset the differential pressure setpoint higher or lower to maintain the most critical polled secondary loop control valve at 85% open or greater. All secondary control valves shall be polled on a 10-minute interval and their valve positions reviewed to determine if any valve is at least 85% open. The secondary loop VFD differential pressure setpoint shall be adjusted downward in 0.1 psi steps until at most critical control valve is at 85% or greater open, but less than 95% open and the space temperature is satisfied. The pump speed is not allowed to be reduced lower than the minimum pump speed as set by balancer (based on maintaining minimum stable pump flow and to avoid pump motor overheating). The reverse shall occur when the 10-minute interval polling notes that the most critical control valve is open 95% or greater and the secondary loop VFD differential pressure set point shall be incremented in 0.1 psi steps to allow the pump to speed up. The max speed of the pump shall be limited by the max differential pressure setpoint of ___ psi adjustable. Per Section 6.4.3.10.2 of ASHRAE 90.1-2016, chiller factory OEM controls shall be able to automatically detect those zones and systems that may be excessively driving the reset logic and generate an alarm or other indication to the system operator for removal of zone(s) from the reset algorithm. Resetting of the differential pressure setpoint may be done over the network by the BMS issuing a BACnet network variable to the chiller factory OEM pump controller.
- e. When the secondary differential bypass valve is fully open, the differential pressure transmitter measuring the main secondary supply and return line pressures is above set point and chilled water temperature set point is at the highest, the system bypass valve will open to allow the constant primary loop water system to loop back to maintain constant primary loop water flow.

- f. When the chiller plant is on-line, the chiller factory OEM controls or the local primary pump control panel shall index the secondary system to start. Upon a command to start, the secondary chilled water pumps shall enable the lead pump's VFD via chiller factory OEM controller. The VFD inverter shall start the pump and ramp it to operating speed. When indication from the VFD is received confirming that the lead pump is running, the chiller factory OEM Controller control system shall, via a proportional-integral (PI) loop, ramp the motor to maintain the differential pressure setpoint of ____ psig, (adjustable setpoint) as sensed by the differential pressure sensor located as shown on the Drawings and as described above.
- g. The secondary loop shall flow at a slower rate than the fixed speed primary loop to ensure proper water blending from the primary loop to the secondary loop at the decoupler pipe. The critical valve reset logic adjusted flow of the secondary loop pump shall be compared to the primary loop pump flow to ensure that the secondary loop flow is always less than the primary loop flow as measured by each loop's flow transmitter. The Carrier chiller factory OEM controls vendor shall work with the Water Balancer to determine the maximum VFD speed setting on each of the secondary water pumps to ensure that the max flow of the secondary water pumps is slightly less than the primary water pumps. There shall be a bypass pressure control valve as shown on the Drawings which shall open when the secondary flow is reduced such that the minimum secondary flow shall be equal to the minimum stable flow of one secondary pump when the VFD has fully throttled down, thus always guaranteeing an on demand supply of available chilled water and avoiding overheating of the secondary pump motors.
- h. Carrier chiller factory OEM controller will provide all available points to BACnet network vendor for monitoring, trending, and controls purposes.

3.09 EXHAUST FANS

- A. Occupied Mode: The fan shall operate at constant speed and the motorized backdraft damper shall be open.
- B. Unoccupied Mode: The fan shall be off and the motorized backdraft damper shall be closed.
- C. Point List
 - 1. Fan Start/Stop
 - 2. Fan Status

3.10 SMOKE DAMPER

- A. Typical: Smoke damper shall close on signal from a smoke detector located in the duct or within 5 feet of the damper. The fire alarm system shall be capable of overriding this control and opening the damper remotely.

3.11 COMBINATION FIRE AND SMOKE DAMPER

- B. The damper shall close at designated temperature
- C. Typical: Smoke damper shall close on signal from a smoke detector located in the duct or within 5 feet of the damper. The fire alarm system shall be capable of overriding this control and opening the damper remotely.

END OF SECTION 230993

SECTION 232000 – HVAC PIPING

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's name and the schedule, type of class of all pipe and fittings.
 - 1. Where optional materials are specified in the "Pipe and Fitting Schedule", provide a pipe schedule to indicate the options selected; including piped systems, pipe material and break down of pipe sizes.
- B. Quality Control Submittals
 - 1. Installers Qualification Data
 - a. Welder Qualification Data: Copies of certification; including names and previous project experience of welders.
 - b. Brazers Qualification Data for Refrigerant Piping: State refrigerant piping brazing experience; including names and list of previous project experience of brazers.

1.02 QUALITY ASSURANCE

- A. Qualifications of Welding Procedures, Welders and Welding Operators: Comply with the following:
 - 1. Section IX ASME Boiler and Pressure Vessel Code, Part QW Welding.
 - 2. American Welding Society Standard AWS D10.9, AR-3
- B. Qualifications of Brazers: Comply with the following:
 - 1. Section IX ASME Boiler and Pressure Vessel Code, Part QB Brazing.
 - 2. Certification of brazing operator by recognized authorities which require a qualification test.
 - 3. Refrigerant Piping: The persons performing the brazing and their supervisors shall be personally experienced in refrigerant piping brazing procedures.
- C. Codes and Standards
 - 1. Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work and ASME Boiler and Pressure Vessel Code, Section IX, Part QW Welding or in accordance with AWS B2.1 Specifications for Welding Procedure and Performance Qualification.
 - 2. Certify welding of piping work using Standard Procedure Specifications by, and welders tested under supervision of, National Certified Pipe Welding Bureau (NCPWB).

3. 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.
4. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with:
MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69 Pipe Hangers and Supports - Selection and Application
MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices
Piping shall be supported at distances not exceeding the spacing specified in MC Table 305.4 or in accordance with the above MSS standards.
5. Comply with ANSI B31.1A, ASME Code for pressure Piping, and ASHRAE Equipment Guide.
6. New York State Construction Codes: Comply with the New York State Building Code, Mechanical Code, Fuel Gas Code, Plumbing Code and Fire Code. Comply with latest NYS State Education Department Planning Standards.

1.03 **DESIGN AND PERFORMANCE REQUIREMENTS**

B. Heating Hot Water Piping

Operating Pressure	125 psig
Operating Temperature	150° - 250°F
Design Code (ANSI)	B31.9

C. Chilled Water Piping

Operating Pressure	125 psig
Operating Temperature	40° - 60°F
Design code (ANSI)	B31.9

F. Refrigerant Piping

Operating Pressure	700 psig
Operating Temperature	40° - 120°F
Design Code (ANSI)	B31.5

PART 2 – PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Standard Weight Schedule 40 or Extra Heavy Weight Schedule 80 Pipe, black or galvanized: ASTM A 53, ASTM A 106 or ASTM A 135.
- B. Flanges, Welding Neck Type, Same Pressure Rating as Adjoining Pipe: ASME B16.5.
- C. Welding Fittings, Carbon Steel:
 - 1. Butt Welding Type: ASME B16.9
 - a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2
 - b. Bonney Forge Corp's Weldolets
 - 2. Socket Welding Type: ASME B16.11
 - a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2
 - b. Bonney Forge Corp's Thredolets or Sockolets
- D. Compact Design Weld Fittings: Landish Co.'s LP, Nibco Inc's Husky, Taylor Forge Inc.'s Compact Line, Tube Turns Inc.'s Econo.
- E. Malleable Iron, Steam Pattern Threaded Fittings
 - 1. 150 lb. Class: ASME B16.3
 - 2. 300 lb. Class: ASME B16.3
- F. Cast Iron Fittings
 - 1. Drainage Pattern, Threaded: ASME B16.12
 - 2. Steam Pattern, Threaded: ASME B16.4
 - a. Standard Weight: Class 125
 - b. Extra Heavy Weight: Class 250
 - 3. Flanged Fittings and Threaded Flanges: ASME B16.1
 - a. Standard Weight: Class 125
 - b. Extra Heavy Weight: Class 250
- G. Unions: Rated 250 psi at 210 degrees F; ASME B16.39
- H. Unions: Rated 250 psi at 275 degrees F; ASME B16.39
- I. 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.
- J. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

- A. Water Tube, Types K, L, and M: ASTM B 88
- B. Wrot Copper Water Tube Fittings, Solder Joint: ASME B16.22
- C. Flared Tube Fittings:

1. Water Tube Type: ASME B16.26
 2. Automotive Tube Type: SAE J512
 3. Refrigerant Tube Type: SAE J513
- D. Flanges: Conform to the Standards for fittings used in systems.
1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.
- E. Unions: Cast bronze, 150 lb. Class, bronze-to-bronze seats, threaded or solder joint.
- F. Cast bronze threaded fittings, Class 125 working steam pressure, conforming to ASTM B62 and ASME B16.24.
- G. Hydronic press fittings (press fit - pressure-sealed joints) by Viega ProPress, Elkhart Xpress, NIBCO Press System, Grinnell G-Press (or approved equal) up to and including 4" in diameter. O-rings: EPDM; Special Tools recommended and approved by the Manufacturer. Press fittings are not acceptable for refrigerant piping.
- H. Mechanically formed tee-branch outlets may be used on aboveground copper tubing. The mechanically formed outlet shall be by T-Drill Industries, Inc. or approved equal. All joints formed in this manner shall be brazed in compliance with manufacturer's recommendations. Soft soldered joints shall not be permitted.

2.03 JOINING AND SEALANT MATERIALS

- A. Thread Sealant
1. Lake Chemical Co.'s, Slic-Tite.
 2. Loctite Corp's pipe sealant with Teflon.
- B. Solder: Solid wire type conforming to the following:
1. Lead-free tin-Silver solder (ASTM B 32 Alloy Grade Sn 96): All-State Welding Products Inc.'s 430, J. W. Harris Co. Inc.'s Stay-Brite or Engelhard Corp's Silvabrite.
- C. Soldering Flux for Soldered Joints
1. Solder: All-State Welding Products Inc.'s Duzall; J. W. Harris Co. Inc.'s Stay-Clean; Engelhard Corp's General Purpose Liquid or Paste.
- D. Brazing Alloys
1. AWS A5.8, Class BCuP-5, for brazing copper to brass, bronze, or copper; Engelhard's Silvaloy 15; J. W. Harris Co.Inc.'s Stay-Silv 56; and Handy & Harman's Braze 560.
 2. AWS A5.8, Class BAg-7, for brazing copper to steel or stainless steel; Engelhard's Silvaloy 56-T; J. W. Harris Co.Inc.'s Safety-Silv 56; and

Handy & Harman's Braze 560.

- E. Brazing Flux: FS O-F-499, Type B; Handy & Harman's Handy Flux or J. W. Harris Co. Inc.'s Stay-Silv.
- F. Electrodes and Welding Rods
 - 1. Electrodes for use in Arc Welding: Heavily coated, not larger than 3/16 inch diameter exclusive of coating, unless otherwise acceptable.
 - 2. Welding Rods: Free flowing when fused, so as to avoid excessive puddling.
 - 3. Electrodes for Welding Stainless Steels: Coated and used with reverse polarity
 - 4. Filler material shall conform to the appropriate AWS-ASTM specification.
- G. Flange Gasket Material
 - 1. For Use with Cold Water or Chilled Water: 1/16 inch thick rubber and chemical compatibility with the system fluid.
 - 2. For Use with Hot Water, Air or Steam: Waterproofed non-asbestos mineral or ceramic fiber, or a combination of metal and waterproofed non-asbestos mineral or ceramic fiber, designed for the temperature and pressures of the piping systems in which installed and chemical compatibility with the system fluid.
- H. Anti-Seize Lubricant: Bostick Inc.'s Never Seez or Dow Corning Corp's Molykote 1000.

2.04 GROOVED PIPING SYSTEM

- A. Grooved piping system as manufactured by Victaulic Co., Grinnell by Tyco, Gruvlok by ANVIL or acceptable manufacturer.
- B. Pipe:
 - 1. Standard Weight Schedule 40 or Extra Heavy Weight Schedule 80 Pipe, black or galvanized: ASTM A 53, ASTM A 106 or ASTM A 135.
 - 2. Use roll grooved pipe, cut grooved end piping is not acceptable.
 - 3. Couplings: Victaulic Co.'s flexible type Style 77 and W77,-having pressure rating of:
 - a. 1000 psi for 3/4 inch to 6 inch
 - b. 800 psi for 8 inch to 12 inch
 - c. 350 psi for 14 inch to 24 inch
- C. Couplings and Fittings for Grooved End Pipe
 - 1. Grooved-End-Tube Couplings: Rigid pattern gasketed fitting. Ductile-iron housing cast with offsetting, angle-pattern bolt pads to provide visual confirmation of joint integrity upon metal-to-metal pad contact. Tongue and recess rigid type couplings may only be used if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer's latest recommendations and each coupling shall be

tagged indicating the specific value of torque attained to confirm joint rigidity and proper installation. Synthetic EPDM gasket similar to Grade EHP rated for maximum 250 deg F or Grade E EPDM rated to maximum of 230 deg F for use with housing, and steel bolts and nuts. Couplings shall be manufactured to connect copper tubing sized tube and fittings.

2. Couplings: Victaulic co.'s Zero-Flex Style 07 and 107H, having minimum pressure rating of:
 - a. Style 107H or Style 07
 - 1) 750psi from 2 inch to 5 inch
 - 2) 700psi for 6 inch
 - 3) 600psi for 8 inch
 - 4) 500psi for 10 inch (07 only)
 - 5) 400psi for 12 inch (07 only)
 - c. Style W07: 350 psi.
1. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
 - a. Steel: ASTM A53 or A106, Grade B
 - b. Wrought Steel: ASTM A234, Grade WPB
 - c. Ductile Iron: ASTM A536
2. Gaskets for Use with Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.
3. Flange Adapter: Flat face, ductile iron housings with elastomeric pressure responsive gasket, for direct connection to ANSI Class 125 or 150 flanged components. Victaulic Style 741/W741.
4. Pipe Joint Make-up:
 - a. Grooved Pipe Joint. Make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions. Pipe grooving shall be rolled in accordance with joint manufacturer's specifications. Lubricate gasket exterior including lips, pipe ends and housing interiors to prevent pinching the gasket during installation. Lubricant shall be as recommended by coupling manufacturer.

2.05 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

- A. Oakum: FA A-A-1186
- B. Mechanical Modular Seals: Thunderline Corp's Link Seal wall and floor seals designed for the service of piping system in which installed.

2.06 DIELECTRIC CONNECTORS

- A. Brass nipples, couplings, fittings, valves or combinations of are not considered a dielectric connection and shall not be an acceptable assembly for such.
- B. Dielectric waterway fittings with an inert, non-corrosive thermoplastic lining (NSF/FDA listed). Manufacturer: Grinnell, GruvLok or Victaulic Co.
- C. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers and dielectric gasket.

1. Rated 250 psi at 210 degrees F.
 2. Rated 250 psi at 275 degrees F.
- D. Flange Unions: Rated 175 psi at 210 degrees F; ASTM B16.42 (iron) and ASTM B16.24 (bronze).

2.07 PIPE SLEEVES

- A. Type A: Schedule 40 steel pipe.
- B. Type B: No. 16 gauge galvanized sheet steel.
- C. Type C: Schedule 40 steel pipe and 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collar as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.
- D. Type D: No. 16 gauge galvanized sheet steel with 16 gauge sheet steel metal collar rigidly secured to sleeve. Size metal collar as required to span a minimum of one cell or corrugation on all sides of the rough opening thru the metal deck.

2.08 FLOOR, WALL AND CEILING PLATES

- A. Cast Brass: Polished chrome plated finish, with set screw.
1. Solid Type: Models 5 and 5T by Pegasus Manufacturing Inc., Cheshire, CT; and Models 951 – 960 (inclusive) by Bridgeport Plumbing Products, Moultrie, GA.
 2. Split Type: Models 3 and 3T by Pegasus Manufacturing Inc., Cheshire, CT.
- B. Cast Iron: Solid type, unplated, with set screw. Model 395 by Grinnell Corp., Cranston, RI.

2.09 DRIP PANS

- A. Fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2 1/2". 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.

PART 3 - EXECUTION

3.01 INSTALLATION – GENERAL

- A. The drawings show the general arrangement of pipe equipment but do not show all required fittings and offsets that may be required. Provide all necessary fittings, offsets and pipe runs based on field measurements.
- B. Provide dielectric connections whenever connecting dissimilar materials

- C. Install vertical piping plumb and piping generally parallel to walls and column center lines, unless shown otherwise on the drawings. Space piping, including insulation, to provide one inch minimum clearance between adjacent piping or other surface. Unless shown otherwise, slope steam, condensate and drain piping down in the direction of flow not less than 25 mm (one inch) in 12 m (40 feet). Provide eccentric reducers to keep bottom of sloped piping flat.
- D. Install piping clear of door swings and above sash heads.
- E. Make allowances for expansion and contraction.
- F. Use fittings for offsets and direction changes, except for Type K soft temper water tube.
- G. Cut pipe and tubing ends square: ream before joining.
- H. Threading: Use American Standard taper pipe thread dies.
 - 1. Thread brass pipe with special brass threading dies.
- I. Make final connections to equipment with unions, flanges, or mechanical type joint couplings.
- J. Provide taps and install wells in piping for EMS/control system sensors and flow measurement devices.
- K. 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.
- L. 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.
- M. Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures. Install drip pan under piping that must be run above electrical equipment. Do not run piping in stairwells or elevator equipment rooms except for systems serving those spaces.

- N. 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.
- O. Riser Casings: Unless otherwise indicated on the drawings, all exposed risers, including the drop risers, shall be enclosed in casings extending from floor to a height of 7'-6" above floor. Riser casings shall be installed after the pipe insulation work is completed, inspected and approved. Casings shall be made of 24-gage galvanized sheet steel, with the upper end wired with 1/8" half hard wire. Each casing shall be fastened to the wall at the upper end with a metal band and round head screws. Seams shall be located at the rear of the casing.
- P. 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.
- Q. Protection of Refrigerant Piping Located Inside Buildings: Refrigerant piping and fittings installed at a height less than 7'-3" above the floor shall be concealed or otherwise protected from mechanical damage except at the point of connection to terminal equipment.
- R. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7'-3" above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has openings to means of egress. Refrigerant piping shall not be installed in an enclosed public stairway, stair landing or an exit.
- S. Refrigerant piping shall not be installed in public corridors unless it complies with all of the following conditions:
 - 1. The refrigeration system to which the piping is associated utilizes a Group A-1 refrigerant and contains not more than 10 pounds of refrigerant per system, and there is not more than one system's refrigerant piping per tenant per public corridor; and
 - 2. A complete discharge of any one refrigerant system's charge into the volume of the public corridor would be insufficient to achieve 50% of the allowable refrigerant RCL set forth in ASHRAE Standard 34; and
 - 3. Refrigerant piping and fittings within a public corridor are installed with brazed joints or the refrigerant equipment manufacturer provided pre-charged tubing systems installed in accordance with the refrigerant equipment manufacturers instructions. Refrigerant piping and fittings shall be concealed or otherwise protected from mechanical damage.
- T. Refrigerant piping shall not penetrate floors, ceilings or roofs except the following:
 - 1. Penetrations connecting the basement and the first floor

2. Penetrations connecting the top floor and a machinery penthouse or roof installation
 3. Penetrations connecting adjacent floors served by the refrigeration system.
 4. Penetrations by piping in a direct system where the refrigerant quantity does not exceed the RCL set forth in ASHRAE Standard 34 for the smallest occupied space through which the piping passes.
 5. Penetrations by piping enclosed by gas-tight, fire resistive duct or shaft as shown on the Drawings.
- U. For steel piping runouts not detailed on the Drawings, use three elbow connections between runouts and mains.
- V. Connections to Equipment: provide three elbow runouts to all rotating equipment such as pumps and chillers. Provide swing connections for boilers. Provide two elbow connections to fuel oil tanks.
- W. Connections to Building Structure: connect to trusses and joints at panel points. Provide supplementary steel framing at panel points to transfer loads to framing.
- X. Connection to domestic water system shall be protected by reduced pressure principal backflow preventer.
- Y. 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.

3.02 WATER AND GLYCOL PIPING SYSTEMS

- A. Pitch
1. Pitch horizontal piping 1/8 inch per 10 ft. in direction indicated on drawings. When direction of flow is not indicated, pitch supply piping up in direction of flow and return piping downward in direction of flow.
 2. Pitch single pipe systems up in direction of flow 1/8 inch per 10 ft.
- B. Air Vents: Install air vents at locations indicated on the drawings and at each high point in system. Use manually operated air vents, unless otherwise indicated.
- C. Drains
1. Install piping to be completely drainable. Provide drains at low points, consisting of a 1/2 inch Drain Valve (Apollo #78-200) and at the following locations and equipment:
 - a. In each section of piping separated by valves.
 - b. For each riser, where riser or runout to riser has a valve installed.
 - c. For each heating cooling unit, having valves in supply and return connections.

- d. In low point of piping to each down fed convector or radiator.
- D. Runouts: Connect runouts to upfeed risers to top of mains and runouts to downfeed riser to bottom of mains.

3.03 GAS PIPING SYSTEMS

- A. Install in compliance with the National Fuel Gas Code-NFPA 54 and as required by the serving gas supplier.

3.04 PIPE JOINT MAKE-UP

- A. Threaded: Threads shall conform to ASME B1.20, joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads on steel pipe with joint compound, or red lead paint for corrosion protection.
- B. Soldered: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to soldering temperature, and join the metals with type solder specified. Remove residue.
- C. Flange:
 - 1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.
 - 2. Provide a gasket for each joint.
 - a. Hot Water Pipe Gasket: Coat with a thin film of oil before making up joint.
 - b. Compressed, Control, and Instrument Air Pipe Gasket: Coat with a thin film of oil before making up joint.
 - 3. Coat bolt threads and nuts with anti-seize lubricant before making up joint
- D. Welded: Beveling, spacing and other details shall conform to ASME B31.9. See Welder's qualification requirements under "Quality Control Submittals" in Section 1.03, Submittals.
- E. Welded: Beveling, spacing and other details shall conform to ASME B31.1. See Welder's qualification requirements under "Quality Control Submittals" in Section 1.03, Submittals.
- F. Compact design weld fittings up to and including 12 inch in size may be used in low pressure steam and heating hot water piping systems.
- G. Braze Joint: Thoroughly clean tube end and inside of fitting with sandpaper or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to brazing temperature, and join the metals with brazing alloy. Remove residue.
- H. The use of mechanical formed outlets on copper tubing instead of soldered joints is acceptable. The maximum diameter of branches shall be 2¹/₈". Use appropriate tool designed for mechanical formed outlets on copper tubes. All mechanical formed tee fittings shall be brazed in accordance with the Copper Development Association's Copper Tube Handbook Using BCuP series filler metal. All

mechanical formed branch collars shall be listed by UPC, and Underwriters Laboratory. They shall comply with ASME Code for pressure piping ANSI B31.5c.

- I. Press-Fit (Pressure Seal) Fittings: 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. The manufacturer's assembly tool shall be used to perform the pressing process. 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.
- J. Dissimilar Pipe Joints
 1. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.
 2. Joining Dissimilar Non-threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.
 3. Joining Steel pipe, Brass or Copper Tubing: Make up joint with a dielectric connector.

3.05 PIPING PENETRATIONS

- A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall, floor, or roof construction.

CONSTRUCTION	SLEEVE TYPE
1. Frame construction	None Required
2. Foundation walls	A*
3. Non-waterproof interior walls	B*
4. Non-waterproof interior floors on metal decks	D*
5. Non-waterproof interior floors not on metal decks	B*
6. Floors not on grade having a floor drain	A*
7. Floors over mechanical equipment, steam service, machine and boiler rooms.	A
8. Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
9. Floors finished or to be finished with latex composition or terrazzo and not on metal decks.	A
10. Earth supported concrete floors	None Required
11. Exterior concrete slabs on grade	A
12. Fixtures with floor outlet waste piping	None Required
13. Metal roof decks	C

- | | | |
|-----|--------------------------------------|---|
| 14. | Mon-metal roof decks | A |
| 15. | Waterproof floor on metal decks | D |
| 16. | Waterproof floors not on metal decks | A |
| 17. | Waterproof walls | A |

* - core drilling is permissible in lieu of sleeves where marked with asterisks.

B. Diameter of Sleeves and Core Drilled Holes

1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
2. Size holes thru exterior masonry walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
 - b. Un-insulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.
 - c. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
 - d. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.

C. Length of Sleeves (except as shown otherwise on Drawings)

1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
2. Floors, Finished: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
 - a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.

D. Packing of Sleeves and Core Drilled Holes

1. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, smoke, fumes, and hot gasses as detailed in the UL Fire Resistance Directory, Warnock Hersey Certification Listings Book, or the Omega Point Laboratories Listings Directory. Where applicable design is not detailed in the Directories use forming materials and fill, void or cavity material to form appropriate through-penetration firestop in accordance with printed details and installation instructions from the Company producing the acceptable forming materials and fill, void or cavity materials.
2. Firestop through-penetration of floors, walls, partitions, ceilings, and roof in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the Construction Work Drawings.

3. Pack sleeves in exterior masonry walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with one-part, non-sag polysulfide base sealant: Pecora's Synthacalk GC-9, Products Research and Chemicals PRC Rubber Calk 7000, or Sonneborn's One Part Polysulfide Sealant. Optional use of Mechanical Modular Seals is recommended.
- E. Weld metal collars of sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.06 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed un-insulated piping passing thru floors, walls, and exterior concrete slabs as follows:
 1. In Finished Spaces
 - a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
 - b. Piping over 4 Inch Size: Split, chrome plated cast brass.
 2. Unfinished Spaces (including exterior concrete slabs): Solid, unplated cast iron.
 3. Fasten plates with set screws.
 4. Plates are not required in pipe shafts or furred spaces.

3.07 DRIP PANS

- A. Provide 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 the drain connection and run to a conspicuous location 6" above the floor, the nearest plumbing drain, or elsewhere as indicated on drawings.

3.08 CLEANING, FLUSHING, AND 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. Upon completion of the installation, remove all protecting materials, all scale and grease and leave in a clean condition for painting.
- C. Hanger Adjustments: adjust hangers so as to distribute loads equally on attachments.
- D. Support Adjustment: provide grout under supports so as to bring piping and equipment to proper level and elevation.

3.09 PIPING APPLICATIONS

- A. Gas Piping: Provide a gas supply service connection for burner ignition and pilot to each oil burner. All gas connections shall be installed by a Licensed Plumber.
- B. Fill and Make-Up Water System to match connecting Plumbing Work.
- C. Standard Weight Red Brass Pipe: Use for compressed air reducing station, piping between boiler and water column, between boiler and water feeder, between boiler and secondary low water cut-off, and drip piping from water column, water feeder and secondary low water cut-off.

3.10 PIPING AND FITTING SCHEDULE

- A. Abbreviations: The following abbreviations are applicable to the Pipe and Fitting Schedule.

BS – black steel
CI – cast iron
GE – grooved end
GMI – galvanized malleable iron
GS – galvanized steel
MI – malleable iron
SE – screwed end
ST – steel
SW – standard weight
WE – weld weight
XH – extra heavy weight
- B. Where options are given, choose only one option for each piping service. Deviations from selected option will be allowed if reviewed with Engineer prior to installation.
- C. Schedule of Pipe and Fittings for the different piping services is as follows:
 - 1. Boiler Blow Off (BO & CBD) 250 psig & less: XH BS pipe with WE XH steel fittings.
 - 2. Boiler Trim 250 psig and less:
 - a. 1-1/2 inch and less: XH BS pipe, with SE XH CI fittings, or WE XH ST fittings.
 - b. 2 inch and up: XH BS pipe with WE XH ST fittings.
 - 3. Chemical Feed (CMF) 125 psig and less:
 - a. SW BS pipe with SE & SW CI fitting, or WE & SW ST fittings.
 - 4. Chilled Water (CWS & CWR) 125 psig and less:
 - a. 3 inch and less: SW BS pipe with SE & SW CI fittings, or Type L hard temper copper tubing with wrot copper solder fittings or press-fittings.
 - b. 4 inch and up: SW BS pipe, with SE & SW CI fittings, or WE & SW ST fittings, or GE & GE fittings.
 - 5. Chilled Water (CWS & CWR) 126 psi to 250 psi:
 - a. 2 inch and less: SW BS pipe with SE & SW CI fittings, or Type L hard temper copper tubing with wrot copper solder fittings, and solder.
 - b. Over 2 inch: SW BS pipe, with WE & ST fittings.

6. Cold Water (CW) 125 psig and less:
 - a. All pipe sizes: Type L hard temper copper tubing with wrot copper solder fittings, and solder or press fittings.
7. Domestic Hot Water and Circulating (DHW & DHWC) 125 psig and less:
 - a. 3 inch and less: Type L hard temper copper tubing, with wrot copper solder fittings, and solder or press fittings.
8. Natural Gas Aboveground:
 - a. 1-1/2 inch and less: SW BS pipe, with SE 150 lb. MI fittings, or WE & SW ST fittings.
 - b. 2 inch and up: SW BS pipe with WE & SW St fittings.
9. Hot Water Supply and Return (HWS & HWR) 125 psig and less:
 - a. 3 inch and less: SW BS pipe with SE & SW CI fittings, or Type L hard temper copper tubing with wrot copper solder fittings and solder or press fittings.
 - b. 4 inch size: SW BS pipe, with SE & SW CI fittings, or WE & SW ST fittings, or GE & GE fittings.
 - c. 5 inch and up: SW BS pipe, with WE & SW ST fittings or GE & GE fittings.
10. Vents (V):
 - a. 4 inch and less: SW BS pipe with SE & SW CI fittings.
 - b. 5 inch and up: SW BS pipe, with SW & SW ST fittings.
11. Condensate Drain Piping: Type M hard temper copper tubing with wrot copper solder fittings, and solder or type L hard temper copper tubing with press fittings.
12. Drain Piping other than Condensate and Overflow Drains: SW BS pipe, with SE SW CI fittings, or WE SW ST fittings.

END OF SECTION 232000

MP:xx

SECTION 232003**THERMOMETERS AND GAUGES****PART 1 GENERAL****1.01 SUBMITTALS**

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for each item specified.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Where Federal, NSF, ASME or other standards are indicated or required, products shall meet or exceed the standards established for material, quality, manufacture and performance.

PART 2 PRODUCTS**2.01 MANUFACTURERS/COMPANIES**

- A. Dresser Instruments.
- B. Marsh Bellofram.
- C. Moeller Instrument Co.
- D. Taylor Precision Products.
- E. H.O. Trerice Co.
- F. Weksler Instruments Corp.

2.02 THERMOMETERS

- A. General Design Features:
 - 1. Scale Ranges: 1-1/2 times actual working temperature required for the particular application, as approved.
 - a. Maximum of two degrees between graduations and ten degrees between numerals.
 - b. When scale ranges are in excess of 100 degrees, maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.
 - 2. Direct Reading Thermometers: Bimetallic actuated, dial type, straight pattern, angle pattern, or adjustable angle pattern as required.
 - 3. Remote Reading Thermometers: Vapor tension actuated, or gas actuated type, with extension capillary tube of length as required for the particular application.
 - a. Case type as required for the particular mounting application.
 - 4. Thermometers for Sensing Liquid Temperature: Furnish with separable sockets.

- a. Sockets for Use in Insulated Piping, Insulated Tanks or Similar Equipment: Extension lagging neck type, of length as required to compensate for insulation thickness, and proper immersion.

2.03 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

- A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
 1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
 2. Dial: White enamel background with bold black figures and graduations.
 3. Head Size:
 - a. Installation in Piping: 3inch diameter.
 - b. Installation in Tanks and Similar Equipment: 5 inch diameter.
 3. Stem: Length as required for proper immersion, and to compensate for insulation thickness, with threaded connection for socket.
 4. External Calibration Device.
 5. Separable Socket:
 - a. Water Service: Brass or bronze.
- B. Vapor Tension or Gas Actuated Capillary Thermometers: Adjustable type, with micrometer type pointer or external calibration device, of design and materials as follows:
 1. Case and Ring: Stainless steel or non-ferrous material as approved, with clear acrylic or shatterproof glass lens. Provide case of type as required for the particular mounting application. Case adjustable, allowing rotation of 360°, and stem adjustment of at least 180°. Provide set screw for locking case in desired position.
 2. Movement: Brass with bronze bearings.
 3. Dial: White enamel background, with bold black graduations, numerals and pointer; 3-1/2 inch diameter.
 4. Capillary: Stainless steel.
 5. Bulb: Copper with union well connection.
 6. Separable Socket:
 - a. Water Service: Brass or bronze.

2.04 THERMOMETERS FOR MEASURING AIR TEMPERATURE

- A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
 1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
 2. Dial: White enamel background with bold black figures and graduations.
 3. Head Size: 5 inch diameter.
 4. Stem: Length as required for average duct cross sectional sensing of air temperature, and to compensate for insulation thickness.
 5. External calibration device.
- B. Vapor Tension or Gas Actuated Capillary Thermometers: Adjustable 3-1/2inch dial type, with micrometer type pointer or external calibration device, of design and materials as follows:
 1. Case and Ring: Stainless steel or non-ferrous material as approved, with clear acrylic or shatterproof glass lens. Case adjustable allowing rotation of 360°, and stem adjustment of at least 180°. Provide set screw for locking case in desired position.
 2. Movement: Brass with bronze bearings.

3. Dial: White enamel background, with bold black graduations, numerals and pointer; 3-1/2 inch diameter.
4. Capillary: Stainless steel.
5. Bulb: Copper air sensing bulb with split flange mounting device.

2.05 PRESSURE AND COMPOUND GAUGES

- A. Type: Adjustable dial type with micrometer type pointer, or external calibration device, bronze bourdon tube, and bronze bushed rotary movement.
- B. Dial: White enameled background, and bold black graduations, numerals and pointer; 3-1/2 inch diameter.
 1. Scale Range:
 - a. Standard Gauges: Double normal operating pressure.
 - b. Compound Gauges: From 30" Hg vacuum to double normal operating pressure.
- C. Case: Cast aluminum, brass, or black finished phenolic.
- D. Accuracy: Guaranteed of within 1 percent in middle third of dial range.

2.06 PRESSURE SNUBBERS AND IMPULSE DAMPERS

- A. Pressure Snubbers: H.O. Trerice Co. Model 872.
- B. Impulse Dampers: H.O. Trerice Co. Model 870.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Thermometers:
 1. Install in accordance with the manufacturer's printed installation instructions.
 2. Install direct reading thermometers, when the application requires installation 6 feet or less above the floor or bottom of space in which installed, and remote reading type when the installation is over 6 feet.
- B. Pressure and Vacuum Gauges:
 1. Install in accordance with the manufacturer's printed installation instructions.
 2. For Measuring Liquid Pressure: Install gauges complete with stop cocks and drain cocks.
- C. Pressure Snubbers and Impulse Dampers:
 1. Install pressure snubbers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors under 10 HP.
 2. Install impulse dampers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors 10 HP and over.

END OF SECTION

SECTION 232006**HYDRONIC SPECIALTIES****PART 1 GENERAL****1.01 SUBMITTALS**

- A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.
- B. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Submit 2 copies to the Engineer incorporated within maintenance manuals, covering the installed products.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

Taco
Bell & Gossett
Aurora Pumps

2.02 EXPANSION TANKS

- A. Type B Expansion Tank: Pre-pressurized, welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with heavy duty butyl rubber bladder or diaphragm, air charging valve, and drain valve.
 - 1. Maximum Working Pressure: 125 psig.
 - 2. Maximum Operating Temperature: 240 degrees F.

2.03 COMBINATION AIR SEPARATOR AND SYSTEM STRAINER

- A. Type: Welded steel (ASME Boiler and Pressure Vessel Code Section VIII, Division I) with the following features:
 - 1. Internal stainless steel strainer with 3/16 inch perforations and free area greater than 5 times the cross sectional area of the connecting pipe.
 - 2. Bolted and gasketed removable cover plate.
 - 3. Blowdown connection with ball valve.
- B. Maximum Working Pressure: 125 psig.
- C. Maximum Operating Temperature: 375 degrees F.

2.04 CHEMICAL BY-PASS FEEDER

- A. By-Pass Feeder/Filter: Combined chemical addition and filtering, capacity of two

gallons, complete with an opening in the top to facilitate charging with chemical, and a screen to properly distribute flow through feeder. Constructed of carbon steel, floor support legs, ¼ turn positive seal quick release cap, for a working pressure of 200 psi, provide 12 filter changes (min. 20 micron). Approved Manufacturers: JL Wingert Co, Neptune Chemical or Cannon.

2.05 CENTRIFUGAL SEPARATOR

- A. Separator: Constructed of carbon steel with no moving parts or filter media, 125 psi maximum pressure rating, and capable of removing solids 74 microns/200 mesh in size and larger; Lakos Separators, Fresno, CA.
 - 1. Automatic Purge Controller: Solid state single channel controller mounted in weather resistant metal enclosure with hasp style closure, and adjustable purging duration from 8 seconds to 30 minutes.
 - 2. Motorized Ball Valve: Lakos Series LR-MBV.

2.06 COALESCING AIR AND SEDIMENT SEPARATOR

- A. The separator shall be designed, constructed, and stamped in accordance with Section VIII, Division I of the ASME Boiler and Pressure Vessel Code, and registered with the National Board of Boiler and Pressure Vessel Inspectors.
- B. The separator shall be rated for 150 psi maximum working pressure and a maximum temperature rating of 450°F.
- C. The body shall be made of carbon steel, shall be at least two times the nominal inlet/outlet pipe diameter, and should include two equal chambers above and below the inlet/outlet nozzles.
- D. The internal coalescing medium shall consist of corrugated stainless steel sheets with 3/16" perforations and 58% open area. The coalescing medium shall be made of 304 stainless steel. The coalescing medium shall be removable to facilitate routine cleaning.
- E. The separator should be capable of removing 100% of free and entrained air and 99% or more of total suspended particulate.
Provide a threaded blow down connection to allow for sediment to be regularly cleaned out of the unit, a threaded air removal connection on top of the unit so an air vent or expansion/compression tank can be connected, allowing collected air to be removed from the unit, and a threaded skim valve connection on the side of the unit to allow floating sediment to be removed.
- F. Provide flanged or grooved end connections. Flange end connections should be designed according to ANSI Standards.
- G. Provide a magnetic insert for removal of iron oxide and other magnetic sediment. The magnetic insert shall be made of Neodymium 45H and should have a gauss strength of at least 13,550.

2.07 AIR CONTROL FITTINGS

- A. Top Outlet Boiler Fittings: Cast iron body and copper dip tube.
 - 1. Maximum Working Pressure: 175 psig.
 - 2. Maximum Operating Temperature: 250 degrees F.
- B. Side Outlet Boiler Fittings: Cast iron body and internal dip tube.
 - 1. Maximum Working Pressure: 125 psig.
 - 2. Maximum Operating Temperature: 275 degrees F.
- C. In-Line Fittings: Cast iron body.
 - 1. Maximum Working Pressure: 125 psig.
 - 2. Maximum Operating Temperature: 275 degrees F.
- D. Insertion Type Tank Fitting (Expansion Tanks Less Than 100 Gallons): Cast iron body with copper dip tube and water relief tube.
 - 1. Maximum Working Pressure: 125 psig.
 - 2. Maximum Operating Temperature: 240 degrees F.
- E. In-Line Type Tank Fitting (Expansion Tanks 100 Gallons and Larger): Cast iron body with bolted and gasketed cast iron cover, internal copper U tube, stainless steel ball check, and separate dip type air vent fitting.
 - 1. Maximum Working Pressure: 125 psig.
 - 2. Maximum Operating Temperature: 240 degrees F.

2.08 AIR VENTS

- A. Type B: Automatic Float Operated Vent; ITT Hoffman Model 78.
 - 1. Construction: Brass body with stainless steel ball check, and 1/8 inch safety drain connection.
 - 2. Maximum Working Pressure: 150 psig.
 - 3. Maximum Operating Temperature: 250 degrees F.
- B. Type C: Automatic High Capacity Float Operated Vent; Sarco Model 13W, or ITT Bell and Gossett Model 107.
 - 1. Construction: Cast iron body with bolted and gasketed cover, and stainless steel float mechanism, and 3/8 inch drain connection.
 - 2. Maximum Working Pressure: 150 psig.
 - 3. Maximum Operating Temperature: 250 degrees F.
- C. Type D: Automatic High Pressure Float Operated Vent; ITT Hoffman Model 792.
 - 1. Construction: Cast iron body (30,000 psi tensile strength) with heat treated stainless steel internal parts, and stainless steel float.
 - 2. Maximum Working Pressure: 250 psig.
 - 3. Maximum Operating Temperature: 300 degrees F.
 - 4. Maximum Hydrostatic Pressure: 350 psig.

2.09 PUMP SUCTION DIFFUSERS

- A. Construct unit with angle pattern cast-iron body, threaded for 2" and smaller, flanged for 2-1/2" and larger, pressure rated for 175 psi. Provide inlet vanes with length 2-1/2 times pump suction diameter or greater. Provide cylinder strainer with 3/16" diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head. Provide disposable fine mesh strainer to fit over cylinder strainer. Provide permanent magnet located in flow stream, removable for cleaning. Provide adjustable foot support designed to carry weight of suction piping. Provide blowdown tapping in bottom, gage tapping in side.

2.10 PUMP DISCHARGE VALVES

- A. Provide pump discharge valves as indicated. Provide non-slam check valve with spring-loaded disc and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Design valves to permit repacking under full line pressure, and with bolt-on bonnet. Provide flanged cast-iron valve body, pressure rated for 175 psi, maximum operating temperature of 300°F (149°C). Provide straight or angle pattern as indicated.

2.11 TRIPLE DUTY VALVE

- A. The valve shall be either straight or angle pattern, non-adjustable design.
- B. The valve shall be a globe valve design with a spring-loaded check valve design to prevent gravity circulation and backflow and a calibrated nameplate with multi-turn stem.
- C. The valve shall include a rubber memory button to allow the valve to be re-balanced to its original position after shut-off or maintenance.
- D. The valve shall have a fully back-seating disc to allow the valve packing to be replaced while under pressure.
- E. The valve body shall be made of either cast iron or ductile iron, the disc shall be made of brass with an EPDM rubber seat, and the stem and valve spring shall be made of stainless steel.
- F. The valve shall be available with either flanged end connections or grooved end connections. Flange end connections should be designed according to ANSI Class 150 Standards.
- G. Valve models with flange x flange end connections shall be rated for 175 psi maximum working pressure. Models with groove x groove end connections should be rated for 300 psi working pressure.
- H. The valve shall have a maximum temperature rating of 250°F.

2.12 LIQUID FLOW SWITCHES

- A. Provide liquid flow switches as indicated to sense flow and non-flow. Construct of brass for all wetted parts, provide packless construction. Provide paddle with removable segments for pipe size and flow velocity. Provide vapor-proof electrical compartment for switches mounted on cold hydronic piping systems. Furnish switches for 115 volt, 60 cycle, single phase with 7.4 amp. rating; or otherwise as indicated.

2.13 PRESSURE REDUCING VALVES

- A. Provide pressure reducing valves as indicated to maintain operating pressure on the system. Brass construction, low inlet pressure check valve, inlet strainer removable without system shut-down, non-corrosive valve seat and stem, factory set at operating pressure.

Manufacturers: Bell & Gossett Model B7-12 (adjustable range 10-25 psig), or Bell & Gossett Model #7 (adjustable range 25-60 psig) or acceptable equal.

2.14 COMBINATION BALANCING VALVE AND FLOW METER

- A. Threaded and Soldered End Ball Style Types (3 inch size and Less):
1. Normal Flow (3 inch size and Less): Bell & Gossett Series CB Circuit Setter Plus.
 - a. Features:
 - 1) Body: Bronze.
 - 2) Ball: Brass.
 - 3) Seat Rings: Glass and carbon filled TFE.
 - 4) Readout Valves: Capped brass type with EPT internal check valves.
 - 5) Stem "O" Ring: EPDM.
 - 6) Calibrated nameplate and memory stop indicator.
 - b. Maximum Working Pressure:
 - 1) Threaded End: 300 psig.
 - 2) Solder End: 200 psig.
 - c. Maximum Operating Temperature: 250 degrees F.
 - B. Flanged and Grooved End Ball Style Types (4 inch size and Up): Bell & Gossett Series CB Circuit Setter.
 1. Features:
 - a. Body and Bonnet: Cast iron (flanged end type) or ductile iron (grooved end type).
 - b. Disc: Bronze with EPDM insert.
 - c. Stem: Stainless steel.
 - d. Packing: Replaceable, teflon-graphite (asbestos free).
 - e. Gasket: Synthetic fiber-nitrile binder (asbestos free).
 - f. Seal Ring: EPDM.
 - g. Bushing: Zinc plated steel.
 - h. Calibrated nameplate and memory stop indicator.
 2. Maximum Working Pressure: 175 psig.
 3. Maximum Operating Temperature: 250 degrees F.
 - C. Portable readout meter with hoses, shutoff valve and vent valve, and carrying case (B&G Model RO-5 or equal).

2.15 FLOW METERING FITTINGS

- A. Venturi type, complete with quick disconnect valves, safety shut-off valves, with a metal identification tag chained to each fitting. Include the following stamped data on tag: Pipe size, venturi series, station identification and meter reading at design flow rate. Maximum pressure loss through metering fittings shall not exceed 10% of the created differential pressure. One piece brass, screwed ends. Manufactured by Barco; Robertson; or Victaulic.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the work of this section in accordance with the manufacturer's written instructions.
- B. Diaphragm-Type Compression Tanks: Install diaphragm-type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.
- C. Combination Air Separator and System Strainer: Install the Work of this Section in accordance with the manufacturer's printed installation instructions.
- D. Air Separator: Install in-line air separators in pump suction lines. Connect inlet and outlet piping. Install piping to compression tank with 1/4" per foot (2%) upward slope towards tank. Install drain valve on units 2" and over.
- E. Chemical By-Pass Feeder / Filter: Provide each hydronic system with an independent chemical by-pass/feeder system. Installed accordance with manufacturer's printed installation instructions, complete with isolation valves, unions and bottom drain (ball) valve.
- F. Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser and elsewhere indicated. Install shut off valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.
- G. Glycol: Install glycol in accordance with manufacturer's printed installation instructions.
- H. Pump Suction Diffusers: Install on pump suction inlet, adjust foot support to carry weight of suction piping. Install nipple and shutoff valve in blowdown connection. After cleaning and flushing hydronic piping system, but before balancing of hydronic piping system, remove disposable fine mesh strainer.
- I. Pump Discharge Valves: Install in horizontal or vertical position with stem in upward position; allow clearance above stem for check mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balance position.
- J. Liquid Flow Switches: Install liquid flow switches on inlet to water chiller, inlet to water condenser, and elsewhere as indicated. Install in horizontal pipe with switch mounted in tee on top of pipe with minimum of 24" of straight pipe with no fittings both upstream and downstream of switch. Remove segments of paddle to fit pipe in accordance with manufacturer's instructions. Wiring of liquid flow switches is specified in applicable Division-23 sections, and is included as work of this section.
- K. Pressure Reducing Valves: Install for each hot water boiler and heat exchanger as indicated, and in accordance with manufacturer's installation instructions.
- L. Install flow metering fittings in accordance with the manufacturers printed installation

instructions.

END OF SECTION 232006

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SECTION 232123**PUMPS****PART 1 - GENERAL****1.01 SUBMITTALS**

- A. Product Data: Catalog sheets and installation instructions for each type or size pump.
- B. Schedule: Pump schedule showing pump specifications and application.
- C. Quality Control Submittals: Performance curves for each pump, showing gpm, brake HP and efficiency from free delivery to shut-off. Chart curves on manufacturer's factory tests shall be conducted in accordance with the recommended procedures of the Hydraulic Institute, and certified thereto by the manufacturer.
- D. Contract Closeout Submittals: Operation and Maintenance Data: Submit 2 copies to the Engineer, incorporated within maintenance manuals, covering the installed products.

1.02 MAINTENANCE

- A. Spare Parts: Deliver one spare set of mechanical seals for each size and type of in-line, coupled and base mounted circulating pump to the Owner's Representative, who will sign receipt for same. Provide seals of type as required for the particular pump application and the chemical water treatment being utilized. Suitably box and label spare seals as to their usage.
- B. Parts List: Submit complete parts list for each type of pump or pumping apparatus.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

Taco
Bell & Gossett
Aurora Pumps

2.02 PUMPS - GENERAL

- A. Provide pumps that will operate continuously without overheating bearings or motors at every condition of operation on the pump curve, or produce noise audible outside the room or space in which installed.
- B. Provide pumps of size, type and capacity as indicated, complete with electric motor and drive assembly, unless otherwise indicated. Design pump casings for the indicated working pressure and factory test at 1-1/2 times the designed pressure.
- C. Provide pumps for ethylene glycol usage as specified for water, of type as indicated.
- D. Provide pumps of the same type, the product of a single manufacturer, with pump parts of the same size and type interchangeable.

- E. Provide pumps using oil for lubrication, with the exception of in-line circulating and close coupled pumps, with constant level oilers.
- F. Provide base mounted pumps with metal guards installed over the moving drive assembly. Fabricate guards from expanded galvanized metal or galvanized sheet metal, designed to meet all safety codes. Secure guards as required and acceptable.
- G. When variable frequency drives are used to control pump speed provide the manufacturer's recommended flexible coupling capable of operating at various torque and speed ratings. Coordinate with drive manufacturer.

2.03 CIRCULATING WATER PUMPS

- A. In-Line Pump: Provide single stage volute type pump, with a cast or forged bronze impeller, replaceable mechanical seals, oil lubricated shaft sleeve bearings and a cast iron casing with flanged inlet and outlet connections. Direct connect pump to electric motor with a flexible coupling.

- 1. Motor Requirements:

- a. Equip motor with built-in thermal overload protection.
- b. Nominal full-load three phase motor efficiency:

HP	PERCENT
1-2	84.0
3-6	88.0
7-14	89.5

- B. Close-Coupled Pump: Provide a horizontal, volute, single stage, end suction centrifugal type, with mechanical seals and a casing and frame of cast iron. Design casing for a 125 psig working pressure, with a vent cock in the top and drain plug in the bottom, with flanged inlet and outlet connections. Provide bronze impeller of the closed type, keyed to shaft and held in place with a self-locking bronze impeller nut. Direct connect pump to electric motor with a flexible coupling, or shaft may be common for pump and motor. Fabricate shaft from 1035 SAE steel, with AISI Type 316 stainless steel or bronze shaft sleeves.

- 1. Motor Requirements:

- a. Nominal full-load three phase motor efficiency:

HP	PERCENT
1-2	84.0
3-6	88.0
7-14	89.5

- C. Base Mounted Pump: Provide a horizontal, volute, single stage, end suction centrifugal pump with mechanical seals and a casing and frame of cast iron. Design casing for a 125 psig working pressure, with a vent cock in the top and drain plug in the bottom, with flanged inlet and outlet connections. Provide bronze impeller of the closed type, keyed to shaft and held in place with a self-locking bronze impeller nut. Fabricate shaft from 1035 SAE steel, with AISI Type 316 stainless steel or bronze shaft sleeves. Direct connect

pump to electric motor with a flexible coupling. Mount pump and driving motor on a common cast iron base or a heavy steel bed plate, with suitable lugs for anchor bolting.

1. Provide pumps driven by motors 5 HP and larger with a drip lip type base. Pitch drip lip to pump end and terminate in a tapped drain connection.
2. Motor Requirements:
 - a. Nominal full-load three phase motor efficiency:

HP	PERCENT
1-2	84.0
3-6	88.0
7-14	89.5
15-24	91.0
25-39	93.0
40-49	93.0
50-69	94.1
70-99	94.1
100-124	95.0
125 or greater	95.5

2.04 CHARTS AND DIAGRAMS

- A. Lubrication Charts: Card holder with aluminum or stainless steel frame, plexiglass front and sheet aluminum card backing plate. Minimum size card 8 x 10 inches. Illustrate or type the manufacturer's recommendations for lubrication of each type pump.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in-line circulating pumps between pipe flanges in piping systems. Install overhead pipe supports, both sides of in-line pumps, installed in horizontal piping runs.
- B. Install close-coupled, base mounted and all floor supported pumps or pumping apparatus on concrete pump foundations, or vibration isolating bases, or both, all as noted on drawings or specified. Level, align, and true the equipment utilizing steel shims. Bolt to construction and grout, when grouting holes are provided in bases.

END OF SECTION 232123

MP:xx

SECTION 232513 WATER TREATMENT

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, standard schematic drawings, specifications and installation instructions.
- B. Contract Closeout Submittals
 - 1. Operation and Maintenance Data: Provide one copy of written instructions, framed under rigid plastic, on the procedures, tests required and dosages to be used for the chemical treatment of the system.

1.02 MAINTENANCE

- A. Extra Materials: Furnish a one year supply of water treatment chemicals.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES

Alken Murray Corp.
Bond Chemical Co.
Dearborn Chemical Co.
Heating Economy Services Co., Inc.

2.02 CHEMICAL FEEDERS AND ACCESSORIES

- A. By-Pass Feeder: Capacity of two gallons unless otherwise noted on the drawings, complete with an opening in the top to facilitate charging with chemical, and a screen in the bottom to properly distribute flow through feeder. Design feeder for a working pressure of 200 psi; similar to Type HV-2, as manufactured by Dearborn, Division of W.R. Grace Co.
- B. Chemical: Nitrite.
- C. pH Comparator: Suitable range to conform to the chemical treatment furnished.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install chemical feeders, complete with valves and piping, as indicated on the drawings.

3.02 FIELD QUALITY CONTROL

- A. As a guide to the adequacy of the chemical treatment, maintain the following chemical residual: Nitrite at 1200 ppm, at the pH range of 8.5 to 9.5. Test the system for the concentration of chemical residuals, at least once a month, during the period of this contract. Upon completion of the contract, turn the test comparator set over to the Owner's Operating Engineer at the Site.
- B. Furnish a qualified representative in the employ of the water treatment company to train operating personnel, selected by the Owner, in the procedures and test required to maintain chemical treatment.

END OF SECTION 232513

MP:xx

SECTION 232514**WATER TREATMENT - CLOSED CIRCUIT COOLERS****PART 1 GENERAL****1.01 SUBMITTALS**

- A. Product Data: Catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for the complete system.
- B. Quality Control Submittals:
 - 1. Test Reports: Furnish and deliver to the Engineer, written copies of test results conducted on all systems treated under the Work of this contract.
- C. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Provide written instructions, framed under rigid plastic, on the procedures, test required and dosages to be used for each chemical treatment system.
 - 2. Warranty: Copy of specified warranty.

1.02 QUALITY ASSURANCE

- A. Consultant Water Conditioning Company:
 - 1. Provide the services of an independent professional water conditioning company for the testing and chemical treatment of heating and air conditioning water systems installed under the Work of this contract, as accepted by the Engineer.
 - 2. The water conditioning company shall make an analysis of the year round raw water supply to the building and recommend the chemical dosages to be used and shall periodically check, at least 6 times a year, on the effectiveness of the treatment, prior to final payment on this contract.
 - 3. The water conditioning company shall train operating personnel, selected by the Owner, in the procedures and tests required to maintain chemical control, and shall during the period of the guarantee make at least 6 periodic visits to check the effectiveness and adequacy of the chemical treatment.

1.03 WARRANTY

- A. The Consultant Water Conditioning Company and the (Sub)Contractor shall warranty in writing, that the water systems and any component parts thereof, will experience no more than minimal scale formation, corrosion, pitting, algae and slime growth, for a period of one year from the date of final certificate on this project, when treated in strict accordance with the Consultant Water Conditioning Companies recommendations.

1.04 MAINTENANCE

- A. Extra Materials: Before final payment, deliver to the Owner's Representative at the site, a one year supply of water treatment chemicals for each system installed under this

contract. The one year supply of chemicals will be used by the Owner's Operating Personnel, for the treatment of the water systems, during the period of the Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER'S/COMPANIES

Chemenergy
Bond Chemical Co.
Dearborn Chemical Co.
Heating Economy Services, Inc.

2.02 SYSTEMS REQUIRING TREATMENT

A. Equipment:

1. One closed circuit fluid cooler.

B. General Note:

1. Refer to drawings for capacities of all equipment and systems, and the entering and leaving temperatures of water for all equipment and systems.

2.03 EQUIPMENT FOR TREATMENT OF CLOSED CIRCUIT COOLERS

- A. Controller for monitoring and controlling total dissolved solids and algae growth with water meter actuated timer. Controller shall be microprocessor based with keyboard activated hand/off/auto control of all relay outputs and alphanumeric display. Controller shall operate solenoid bleed valve and chemical feed pumps for dual biocide treatment and corrosion and scale inhibitor treatment. Controller shall be Chemenergy Pulsatrol Model MCT210CF; or acceptable equal.
- B. Chemical feed pumps shall be solenoid driven with adjustable rate and stroke length. Chemenergy Pulsatron A Plus; or acceptable equal.

2.04 TEST EQUIPMENT

- A. Metal test cabinet, similar to Model 100, as manufactured by Chemenergy, complete with sufficient glassware and reagents to make each of the following determinations once a day, for the period of the contract and the guarantee:
1. pH by color comparator.
 2. Chromate by color comparator and titration.
 3. Nitrite by color comparator and titration.
 4. Total dissolved solids by concentration hydrometer.
 5. Chlorides by titration.
 6. Phenolphthalein and methyl orange alkalinity by titration.

2.05 CHEMICALS

- A. As required by water analysis.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install chemical treatment systems, complete with all feeders, valves and piping, as indicated on the drawings, and as required for the treatment of all systems.
- B. Install test cabinet complete with all glassware and reagents, at location as directed by the Owner's Representative.

3.02 FIELD QUALITY CONTROL

- A. It is the intent of these specifications to provide complete systems of chemical treatment to protect Closed Circuit Fluid Cooler systems from scale formations, corrosion, algae and slime growth.
- B. Until final payment is made on this project, chemically treat all water systems for scale formation, corrosion control, algae and slime growth, all as directed by the Consultant Water Conditioning Company.

3.03 TRAINING

- A. Upon completion of the installation, adjustment and operational testing of water treatment systems, a field engineer in the employ of the water treatment manufacturer, shall for a period of 4 hours, instruct duly authorized Owner's Personnel in the operation and maintenance of the installed systems. The aforementioned hours of instruction shall not include any time spent by field engineers in the start-up, adjustment or calibration of the systems, and this instruction time shall be as scheduled and recorded by the Owner's Representative.

END OF SECTION 232514

MP:xx

SECTION 232515 GLYCOL FEED SYSTEM

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, standard schematic drawings, specifications and installation instructions.
- B. Contract Closeout Submittals
 - 1. Operation and Maintenance Data: Provide one copy of written instructions, framed under rigid plastic, on the procedures, tests required and dosages to be used for the treatment of the system.

1.02 MAINTENANCE

- A. Extra Materials: Provide feed tank with 50 Gallons of 40% premixed glycol solution tank shall be full at project close-out.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES

J. L. Wingert Co. - Model #GL50-E1
Neptune Chemical Pump Company – Model #G-50-1A

2.02 AUTOMATIC GLYCOL FEED PACKAGE

- A. Automatic glycol feed package: shall consist of a polyethylene tank, hinged polyethylene lid, carbon steel frame, 120/1/60 with power cord plug, NEMA 4X control panel, low level float switch, 1/3HP open motor bronze gear pump with internal relief valve, pressure switch, relief valve, check valve, Schedule 80 PVC plumbing and vinyl braided hose. Contractor assembled systems are not acceptable.
 - i. Tank and Frame: Polyethylene tank shall be industrial grade with a nominal wall thickness of 1/4". Shoebox type lid shall be 1/3 the diameter hinged with 304 stainless steel piano hinge and 316 stainless steel rivets. Tank frame shall be constructed of carbon steel with bracing for plumbing and control panel. Tank frame shall have 10 gauge pump mount shelf and be coated with water based enamel paint.
 - ii. Pressure Switch: Pressure switch will be prewired to control panel to turn on and off the gear pump based on rising and falling pressure settings.
 - iii. Control Panel: Fiber filled polycarbonate NEMA 4X control panel shall be of ample size for equipment needed and servicing of electrical components. All exterior components shall be rated NEMA 4X and installed per manufacturers instructions. Wiring and wiring diagram shall be color-coded for easy trouble shooting. All internal wire shall be 16-gauge minimum. Controls are, but not

- limited to, main power switch and indicator light, pump hand/off/ auto switch and indicator light, and red low-level indicator light, audible alarm with push button silence and dry contact for low level indication.
- iv. Pressure Relief Valve: Valve will incorporate a gauge with pressure range relative to system pressure settings.
 - v. Check Valve: Back flow check valve shall be tapered valve body design with an enlarged valve chamber to reduce valve chatter. PVC construction with stainless steel spring and raised radius valve seat for positive seal.
 - vi. Low Level Switch: Polypropylene low level switch shall be interlocked with pump feed and low level indicator. Low level will stop all pump operations when level falls below the factory set point.
 - vii. Provide one year manufacturer's warranty from date of substantial project completion

2.01 PROPYLENE GLYCOL

- A. The heat transfer medium shall be at 30% by volume inhibited propylene glycol mixture (fluorescent yellow fluid color) of Dow Chemical Co. - Dowfrost HD.
- B. All manufacturers recommendations in regard to filling, initial system cleaning, and purging shall be adhered to completely.
- C. Provide final water / glycol analysis report.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Automatic Glycol Feed Package, complete with valves and piping, as recommended by the equipment manufacturer and indicated on the drawings.
- B. Glycol System(s): following system cleaning, fill specified glycol system and feed tank to indicated percentage of glycol/water solution indicated. Glycol feed tank shall be topped off at project closeout.
- C. Connections or extension of existing glycol piping systems: Prior to connecting to the existing system(s), take sample of fluid and provide test reports of the existing fluids concentration of glycol and residuals to the Owner for acceptance. If the test results have not been provided prior to connection, the Contractor shall be held responsible in bringing the entire hydronic system within acceptable specifications. Top off the glycol feed tank at project closeout.

3.02 FIELD QUALITY CONTROL

- A. Test the system for the concentration of glycol and residuals and provide test results to engineer for approval.
- B. Furnish a qualified representative to train operating personnel, selected by the Owner, in the procedures and test required to maintain the system.

END OF SECTION 232515

MP:xx

SECTION 233113**METAL DUCTWORK****PART 1 - GENERAL****1.01 REFERENCES**

National Fire Protection Association (NFPA).
Sheet Metal and Air Conditioning Contractors National Association, Inc.
(SMACNA) Current published edition.
American Conference of Governmental Industrial Hygienists (ACGIH).

1.02 SUBMITTALS

- A. Fabrication Drawings: Submit 1/4" = 1'-0" (minimum) scaled reproducible drawings of metal ductwork and fittings including but not limited to: ductwork layout detailing, sizes, fabrication lengths, locations, elevations, slopes of horizontal runs. In addition, indicate wall and floor penetrations, lighting, diffuser, building walls, steel locations with elevations and reflected ceilings (ceiling type and elevations noted). Show interface and space relationships between all items located above ceiling including but not limited to ductwork and equipment. (Submission of Engineers contract document Drawings will not be acceptable).
- B. Shop Drawings: Submit duct construction standards to include schedule of all ducted air systems (indicating pressure class, materials, and seal class), sheet metal type, connections, reinforcement, turning vanes, fitting types, method of support, upper hanger attachment, and duct liner specification.

1.03 QUALITY ASSURANCE

- A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown and/or as specified:
 - 1. HVAC Duct Construction Standards – Fourth Edition 2021.
- B. Conform to the applicable requirements of NFPA 90A, 90B and 96.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. Galvanized Steel: ASTM A653 lock forming quality - galvanizing: ASTM A924 coating designation G-90.
- B. Aluminum: ASTM B-209, Alloy 3003, Temper H-14.
- C. Stainless Steel: AISI Types 302, 304 and 316, as specified.
- D. Carbon steel: ASTM A568.

E. PVC Coated Galvanized Steel

2.02 FABRICATION

- A. Fabricate all ductwork in accordance with this specification and SMACNA.
- B. Fabricate all ductwork from galvanized, stainless steel, carbon steel, aluminum and PVC coated sheet metal as indicated.
- C. Round and flat oval ductwork shall be fabricated using spiral seam construction only. Snaplock seams are not allowed
- D. Rectangular and Round ductwork radius of all 90° through 45° elbows shall be 1.5 times the elbow diameter, unless otherwise noted. The radius of all 15° through 30° elbows shall be 1.0 times the elbow diameter. Mitered elbows shall be provided with turning vanes. Rectangular square throat 90° without turning vanes are not allowed.
- E. Dissimilar Metals: Separate dissimilar metals used for ductwork with 10 oz. canvas impregnated with zinc chromate. No separation is required between screws or rivets and the materials in which they are inserted.
- F. Sheet Metal:
1. Minimum Rectangular Duct Construction to 2" W.G. unless noted otherwise on the contract drawings. For pressure class above 2" refer to SMACNA standards tables.
 2. All ductwork panels 18" and greater in width/height, 20 gage or less shall be cross broken or beaded. Internally lined ductwork is exempt from this requirement.
 3. Duct construction: reinforcement, gages and sealing on fittings, elbows and short lengths of ductwork shall be continuous throughout the system.

Duct Dimension longest side	*Duct Length	Minimum Duct Gage	Transverse Joint Connection / Reinforcement
Up to 16"	48"	24	S-Slip & Drives (Min. 24 ga.)(c)
17" to 28"	48"	24	Flanged (a)(c)
29" to 36"	48"	24	Flanged (a)(c)
37" to 48"	48"	22	Flanged (a)(b)(c)(e)
48" to 84"	48"	20	Flanged (a)(b)(c)(e)
84" to 96"	48"	18	Flanged (a)(b)(c)(e)
97" to 108"	48"	16	Flanged (a)(b)(d)(e)
107" & UP	Refer to SMACNA Tables for pressure class specified		

- a. Flanged ductwork joint connections shall be: SMACNA T-22, T-24, T-24a, T25a, T25b or slip-on flanges. (IE: Ductmate, Ward, Nexus, TDH and TDF installed per manufacturer's recommendations).

- b. Intermediate reinforcement per SMACNA
- c. Longitudinal seam to be Pittsburgh, (snaplock seams are not allowed).
- d. Longitudinal seam to be welded.
- e. Refer to SMACNA reinforcement tables for additional intermediate required reinforcements.

4. Round Duct Construction - Minimum duct wall thickness unreinforced 2" W.G. positive/negative pressure.

Duct Dimension	Spiral Seam
6"	28
8"	28
10"	28
12"	28
14"	28
16"	26
18"	26
19" - 26"	26
27" - 36"	24
37" - 50"	22
51" - 60"	20
61" - 84"	18

Round ductwork shall be a manufactured duct system consisting of fittings that are factory fitted with a sealing gasket and spiral duct which, when installed according to the manufacturer's instructions, will seal the duct joints without the use of duct sealer. Round ductwork shall be fabricated using spiral seam construction. (Snaplock seams are not allowed). Acceptable Manufacturers: Lindab (SPIROsafe); Semco (Custom Air); United McGill Corporation (Uni-Gasket).

- a. All fitting ends shall come factory equipped with a EPDM rubber gasket. Gasket shall be manufactured to gauge and flexibility so as to insure that system will meet all of the performance criteria. Gasket shall be classified by Underwriter's Laboratories to conform to ASTM E84-91a and NFPA 90A flame spread and smoke developed ratings of 25/50.
- b. Fitting ends shall be calibrated to dimensional tolerance standard of the associated spiral duct.
- c. Fitting ends from 3" to 24" diameter shall have over edges for added strength and rigidity.
- d. Elbows from 3" to 12" diameter shall be 2-piece die stamped and continuously stitch welded. All elbows 14" diameter and larger shall be standing seam gorelock construction and internally sealed.
- e. The fittings shall be either spot-welded or button punched construction and shall be internally sealed. When contract documents require divided flow fittings, only full body fittings will be accepted.
- f. Volume dampers as specified in 233300 - Ductwork Accessories.

5. Flat Oval Duct Construction – Minimum duct wall thickness unreinforced 2" W.G. positive/negative pressure.

Duct Width	Spiral Seam Duct Gage	Gage of Fitting
To 24"	24	20
25" to 36"	22	20
37" to 48"	22	18
49" to 60"	20	18
61" to 70"	20	16
71" to up	18	16

Flat Oval ductwork shall be fabricated using spiral seam construction. (Snaplock seams are not allowed). Acceptable Manufacturers: Lindab (SPIROsafe); Semco (Custom Air); United McGill Corporation (Uni-Gasket).

2.03 SUPPORT

A. Duct Hangers

1. Strap Hangers: As indicated below and/or same material as duct.
2. Rod Type Hangers: Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with 2 removable nuts each end for positioning and locking rod in place. Unless stainless steel, galvanized or cadmium plated; shop coat with metal primer.

Maximum Half of Duct Perimeter	Strap @ 10 ft Spacing	Rod @ 10 ft Spacing	Strap @ 8 ft Spacing	Rod @ 8 ft Spacing	Strap @ 5 ft Spacing	Rod @ 5 ft Spacing	Strap @ 4 ft Spacing	Rod @ 4 ft Spacing
P/2 = 30"	1" x 22 ga	10 ga.	1" x 22 ga.	10 ga.	1" x 22 ga.	12 ga.	1" x 22 ga.	12 ga.
P/2 = 72"	1" x 18 ga	3/8"	1" x 20 ga.	1/4"	1" x 22 ga.	1/4"	1" x 22 ga.	1/4"
P/2 = 96"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	3/8"	1" x 22 ga	1/4"
P/2 = 120"	1 1/2" x 16 ga	1/2"	1" x 16 ga	3/8"	1" x 18 ga	3/8"	1" x 20 ga	1/4"
P/2 = 168"	1 1/2" x 16 ga	1/2"	1 1/2" x 16 ga	1/2"	1" x 16 ga	3/8"	1" x 18 ga.	3/8"

P/2 = 192"	-	½"	1 ½" x 16 ga	½"	1" x 16 ga	3/8"	1" x 16 ga.	3/8"
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B. Cable Hanging Systems (Gripple): Cable Hanging Systems with adjustable mechanical devices compliant with SMACNA 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).

C. Miscellaneous Fasteners and Upper Hanger Attachments:

1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
2. Concrete Inserts: Steel or malleable iron, galvanized; continuously slotted or individual inserts conforming with MSS SP-58, Types 18 & 19, Class A-B.
3. C Clamps: Fee & Mason Co.'s 255L with locking nut, and 255S with retaining strap.
4. Metal Deck Ceiling Bolts: B-Line Systems, Inc.'s Fig. B3019.
5. Welding Studs: Erico Fastening Systems, capacitor discharge, low carbon steel, copper flashed.
6. Structural (carbon) Steel Shapes and Steel Plates: ASTM A36, shop primed.
7. Stainless Steel Shapes and Plates: ASTM A276 and ASTM A666.
8. Machine Bolt Expansion Anchors:
 - a. Non-calking single unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 1.
 - b. Non-calking double unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 2.
 - c. Self - drilling type: FS FF - S - 325, Group III, Types 1 and 2

2.04 SEALANTS

- A. Acceptable Manufacturers: Duro Dyne Corp.; Foster Products Div., H.B. Fuller Co.; Hardcast Inc.; United Sheet Metal Div., United McGill Corp.
- B. U.L. Listed adhesives (liquid or mastic), scrim, or combinations thereof, as required for pressure class; suitable for system operating temperatures; compatible with media conveyed within, insulation (if any), and ambient conditions.
- C. Use of duct tape or silicone caulk for sealing seams and joints is not acceptable.

2.05 ACOUSTICAL DUCT LINING

- A. Requirements of Regulatory Agencies:
 1. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B and should not support microbial growth as tested in accordance with ASTM G21 and G22.
 2. The duct liner shall conform with the requirements of ASTM C 1071 with NRC not less than 0.70 as tested per ASTM C423 using a Type "A" mounting, and with a thermal conductivity no higher than .25 at 75°F mean temperature.

3. Installation of duct lining shall be in accordance with the appropriate SMACNA Manual installation detail on drawing as amended by this Section.
- B. Acceptable Manufacturers: Johns Manville Mechanical Insulations Linacoustic RC; or approved equal.
- C. Materials
1. Duct Lining: Minimum 1½" thick fibrous glass, with the side exposed to the airstream coated with a tough, acrylic polymer to guard against incursion of dust or dirt into the substrate. The surface coating shall be specially formulated with an immobilized, EPA-registered anti-microbial agent so it will not support the growth of fungus or bacteria, as determined by test in accordance with ASTM C 1071 and ASTM G21 and G22. Edge coating shall be factory applied to assure coverage of the leading edges per SMACNA requirements. Material shall be a standard catalog item as furnished by a nationally recognized manufacturer.
 2. Adhesive shall be approved by the duct liner manufacturer and shall meet ASTM C 916
 3. Mechanical Fasteners: Furnish fasteners complete with weld pins and retaining clips for securing lining to ductwork. Weld pins shall not distort, mar or burn the ductwork. Acceptable Products: Graham Co. Weld Pins.
 4. Sound Absorption Coefficients: Minimum acceptable coefficients as tested per ASTM C423-61 and ASTM E795

Product Thickness	Mounting Type	Octave Band (Hz)						NRC
		125	250	500	1000	2000	4000	
1½"	"A"	0.1	0.47	0.85	1.01	1.02	0.99	.85

- D. Installing Duct Lining in Low Velocity Ductwork
1. Install duct lining in accordance with SMACNA "Duct Manual and Sheet Metal Construction for Ventilating and Air Conditioning Systems", except as specified otherwise herein and indicated on drawings.
 2. Ductwork dimensions noted on the drawings are the inside duct dimensions after the application of lining.
 3. Bond liner to ductwork with a 100% coverage of adhesive, with the factory coated liner surface facing the airstream. Start installation of fasteners within 3" of the leading edge of all transverse joints within upstream leading edge of duct lining. Refer to drawings for installation detail.
 4. All exposed leading edges and transverse joints shall be neatly butted without gaps and be coated with factory-applied edge coating or field-applied factory approved edge treatment. Metal nosings shall be securely installed over transversely-oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct. In addition, coat all exposed surfaces of mechanical fasteners and sheet metal nosing with vapor barrier mastic.

2.06 SEALING REQUIREMENTS

- A. Sealing Requirements

1. Construct as a minimum to the following pressure and seal class.

System	Pressure Class	Seal Class
Supply, return and outside air duct	+2"	'A'
Exhaust and relief duct	-2"	'A'
Dishwasher exhaust	-4"	(a)
Fume hood exhaust	-4"	(b)

- (a) Duct shall be rectangular aluminum duct commercial grade with liquid tight welded seams.
- (b) Duct shall be 20 gauge AISI Type 316 stainless steel with liquid tight welded seams.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Duct Cleanliness Construction Requirements
 1. Duct fabrication, shop storage, transportation to site, site storage, and installation, shall comply with SMACNA Duct Cleanliness Level B and additional requirements as indicated.
 2. Site storage area shall be clean, dry and exposure to dust minimized.
 3. Before installation of individual duct sections, they are to be inspected to ensure that they are free from all debris.
 4. The internal surfaces of the uninsulated ductwork shall be wiped to remove excess dust immediately prior to installation.
 5. Open ends on complete ductwork and overnight work-in-progress shall be sealed.
- B. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Coordinate with all trades proposed locations of ductwork prior to installation.
- C. Provide necessary transformation pieces and flexible fabric connections for ductwork connected to air handling equipment or air inlet and outlet devices.
- D. All transitions shall be made with less than 30° included angle.
- E. Provide safing to properly close off all openings in ductwork or sleeves in which any duct accessory is being installed as required by irregular openings or off-size equipment. All attempts shall be made to maximize the size of the accessory to the opening or duct.
- F. Ductwork installations exposed to view in finished spaces (refer to project documents) shall receive special attention by contractor. Care shall be taken to provide a neat uniform look, Round duct spiral seams shall align. Ductwork will be free of foreign matter (IE: construction debris, mud, dirt, excessive duct sealer, ETC.) Do not install damaged ductwork. Remove damaged ductwork at the direction of the engineer. Ductwork indicated to be painted (refer to project documents). Duct shall be wiped clean of grease, oils and any foreign materials not conducive to the adhering of paint.

- G. Coordinate the installation of all mechanical systems. Provide sufficient space around ductwork and equipment during installation to allow the proper application of insulation. As needed insulate ducts prior to erection in place when ducts are required to be installed proximate to walls, ceilings, equipment or other ductwork, which will not permit adequate space for the installation of insulation, at a later date. Exercise reasonable care in the installation of insulated ductwork, so that insulated surfaces are in perfect condition before and after installation.
- H. Ductwork seen behind registers, in other words; ductwork visible through a register (inside the duct) shall be painted using one coat of flat black metal paint (after proper surface cleaning). Paint coverage shall be that no unpainted duct will be seen. This applies to all grilles, registers and diffusers.

3.02 SEALING SEAMS, JOINTS, AND PENETRATIONS

- A. Conform to SMACNA Seal Class A as a minimum regardless of pressure class except for continuously welded or soldered seams, where called for. Helical (spiral) lock seams are exempt from sealant requirements. All other duct surface connections made on the perimeter of the duct are deemed to be joints. Use of duct tape for sealing of seams and joints is not acceptable.
- B. Sealing requirements shall include, but not be limited to: transverse (girth) joints; longitudinal seams; duct wall penetrations; branch and sub-branch intersections; duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum and casing abutments to building structures.
- C. Pittsburgh sealing, sealant shall be applied in the Pittsburgh pocket prior to hammering. Sealant applied to the interior (back side of seam) of duct or to the exterior of seam is unacceptable.
- D. Ducts and plenums connecting to louvers (intake, exhaust, relief) shall be constructed with the bottom of duct/plenum sloped so that water drains back and out of the louver or to a central drain connection within the plenum. If a drain connection is provided, pipe to nearest floor drain. The duct or plenum shall be sealed as directed in 3.02, A (above). In addition, all seams of lower 6" (or greater, if higher water level potential exists) shall be soldered, or otherwise gasketed and sealed to create water-tight seams, joints and penetrations.

3.03 DUCT MATERIAL INSTALLATION SCHEDULE

- A. Fabricate supply, return, exhaust, and outside air ductwork from galvanized sheet metal except as described below:
- B. Fabricate the following ductwork from aluminum:
 - 1. Inlet and discharge ductwork connected to cooling towers and evaporative condensers.
 - 2. Exhaust ductwork from dishwashers, scullery equipment hoods, showers, locker rooms and swimming pool areas.

- C. Fabricate the following ductwork from stainless steel:
 - 1. Supply, return, and re-circulated air ductwork connected to devices installed in surgical operating, surgical scrub-up, surgical recovery and surgical work rooms. Use AISI Type 302 or 304 stainless steel.
 - 2. Exhaust ductwork connected to laboratory exhaust fume hoods. Install stainless steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air.
 - 3. Dishwashing and other scullery equipment.
- D. Fabricate the following ductwork from PVC Coated galvanized steel:
 - 1. Exhaust ductwork connected to laboratory exhaust fume hoods. Install PVC coated steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air.
 - 2. Ductwork installed underground.
 - 3. Ductwork installed encased in concrete.

3.04 ACOUSTICAL DUCT LINING

- A. In all locations indicated on drawings.
- B. Install duct lining the final ten feet from the inlet side of exhaust fans (excluding grease ducts & laboratory fume hood exhaust.)
- C. Install duct lining from the horizontal ceiling heat pump discharge to the first branch runout or 15 feet.
- D. Install duct lining in the return air ductwork from the horizontal ceiling heat pump to the nearest branch runout or 15 feet.
- E. Install duct lining ten feet down stream of the variable air volume boxes.

3.05 HANGERS FOR DUCTS

- A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:
 - 1. Rectangular ducts up to 42 inches wide, not having welded or soldered seams, and supported from overhead construction; extend strap hangers down over each side of the duct and turn under bottom of duct a minimum of 2 inches. Secure hanger to duct with 3 full thread sheet metal screws, one in the bottom and 2 in the side of the duct.
 - 2. Prime coat plain steel rods threaded at the site immediately after installation with metal primer.

3.06 UPPER HANGER ATTACHMENTS

- A. General: Secure upper hanger attachments to structural steel or steel bar joists wherever possible.

1. Avoid damage to reinforcing members in concrete construction.
2. Metallic fasteners installed with electrically operated or powder driven tools may be used as upper hanger attachments, in accordance with the SMACNA Manual.

B. Prohibited Use

1. Drive-on beam clamps (caddy clamp), flat bars or bent rods, as upper hanger attachments.
2. Powder driven drive pins or expansion nails.
3. Powder driven or welded studs to structural steel less than 3/16 inch thick.
4. Loads in excess of 250 lbs from a single welded or powder driven stud.
5. Powder driven fasteners in precast concrete.
6. Do not use c-clamps to attach hangers in a shear type application. Use sheet metal screws, machine bolts and nuts or welds.

C. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by ductwork support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.

1. Secure upper hanger attachments to steel bar joists at panel points of joists.
2. Do not drill holes in main structural steel members.

D. Attachment to Concrete Filled Steel Decks:

1. Existing Construction: Install expansion shields.
2. New Construction: Install concrete inserts or metal deck ceiling bolts.
3. Do not attach hangers to decks less than 2-1/2 inches thick.

3.07 DUCT RISER SUPPORTS

- A.** Support vertical round ducts by means of double-ended split steel pipe riser clamps bearing on floor slabs or adjacent structural members, at every other floor through which the riser passes.
- B.** Unless otherwise specified or shown on the drawings, support vertical rectangular ducts by means of two steel angles, secured to duct and resting on floor slab or adjacent structural steel member, at every other floor through which the duct passes. Size supports as follows:

Max. Side Dimension (Inches)	Support Angle (Inches)	Secure to Duct with	Min. Bearing at Each End (Inches)
36	1 x 1 x c	Screws	2
48	1½ x 1½ x c	Bolts	3

3.08 OPENINGS THROUGH FIRE RATED WALLS & FLOORS NOT REQUIRING FIRE DAMPERS

- A. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
- B. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame, smoke, fumes, and hot gasses as detailed in the UL Fire Resistance Directory, Warnock Hersey Certification Listings Book, or the Omega Point Laboratories Listings Directory. Where applicable design is not detailed in the Directories, use forming materials and fill, void or cavity material to form appropriate through-penetration firestop in accordance with printed details and installation instructions from the Company producing the approved forming materials and fill, void or cavity material.
- C. Fill the annular space between the duct and the rated construction (both sides of the rated construction) with a non-hardening, intumescent, UL listed firestop product; and in the absence of manufacturer's firestop system installation instructions or Engineer's recommendation, attach 1½" angles around the perimeter of all ducts (both sides of the rated construction).
- D. Firestop through-penetration of floors, walls, partitions, ceilings, and roofs in accordance with the fire resistance rating assigned to the walls, partitions, floors, ceilings, and roofs on the General and Mechanical Construction Drawings.

END OF SECTION 233113

SECTION 233300 DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 REFERENCES

ACGIH: American Conference of Governmental Industrial Hygienists.
NFPA: National Fire Protection Association.
SMACNA: Sheet Metal and Air Conditioning Contractors National Association, Inc.
UL: Underwriters Laboratories, Inc.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, diagrams, standard schematic drawings, and installation instructions for each manufactured product. Submit SMACNA Figure Numbers for each shop fabricated item.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Unless otherwise shown or specified, comply with the applicable requirements of the following:
 - 1. SMACNA: Gages of materials, fabrication, sealing, and installation shall be in accordance with the HVAC Duct Construction Standards Manual.
 - 2. NFPA: Standards No.'s 90A, 90B, 91, 96, and 101.
 - 3. ACGIH: Follow the Hood Design Data, and Construction Guidelines for Local Exhaust Systems from the Industrial Ventilation Manual.

PART 2 - PRODUCTS

2.01 ROUND DUCT TAKE-OFFS / VOLUME DAMPERS

- A. Heavy Duty Bell Mouth Take-off: Air tight 24 ga. galvanized (G-90) gasketed bell mouthed, 22 ga. galvanized single blade damper, 3/8" solid bar shaft, indication / operation handle with locking hex nut and Tekline regulator. On insulated ducts, quadrant to be mounted on hat channel; channel height equal to exterior duct insulation thickness. Provide bearings at both ends of operating shaft. (Provide a 45 deg. take-off when the flange diameter of the bell mouth fitting exceeds the height of the duct main. Also provide a 45 deg. take-off were indicated on the drawings.) (Contractor fabricated dampers not acceptable).

2.02 DAMPERS

- A. Volume Control Dampers: 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 of 2 inch wide x 1/2 inch legs x 1/8 inch thick (minimum) members for dampers less than 10 sq ft in size and

2 inch wide x 1 inch leg x 1/8 inch thick (minimum) for larger sizes. Fabricate blades from No. 16 gage (minimum) metal, of same material as duct in which installed, with 3 horizontal grooves, 2 turned edges and trunnions mounted in brass sleeve or ball bearings. Space bearings on maximum 48 inch centers. Single blade dampers are unacceptable for ducts over 11 inches in height. Weld motor mounting bracket to damper frame, for pneumatic or electric motor operated dampers.

- B. Parallel Blade Dampers: Furnish with 2 inch wide x 1/2 inch leg x 1/8 inch thick metal frames of all welded construction, utilizing channel iron members in steel ducts and extruded aluminum members in aluminum ducts. Fabricate blades from No. 16 gage (minimum) metal, of same material as duct in which installed, with horizontal reinforcing grooves, 2 turned edges and trunnions mounted in bronze sleeve or ball bearings. Single blade dampers are unacceptable for ducts over 11 inches in height. Fabricate dampers of steel for installation in wall openings and for use on discharge side of exhaust fans. 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. Dampers used on outside air and exhaust applications shall have stainless steel edge seals and vinyl blade edge seals to for a maximum leakage rating of 20 cfm per sq.ft. of face area at 4" water gauge differential static pressure. Use when dampers are required to be installed in wall openings for outside air inlet or make-up air use and are interlocked with exhaust fans. Avoid product duplication when a temperature control section is included in specifications.
- C. Outside air, Relief air and Exhaust air: Dampers used on outside air and exhaust applications shall be insulated with thermally broken frame. Frame and blade edge seals shall be extruded silicone secured in an integral slot within the aluminum frame/blade extrusions and shall be mechanically fastened. Dampers shall be AMCA rated for Leakage Class 1A at 1" water gauge differential static pressure. Linkage hardware shall be aluminum and corrosion-resistant zinc-plated steel, installed in the frame side, out of the airstream, and accessible after installation. Linkage hardware shall be complete with cup-point trunnion screws to prevent linkage slippage and a Celcon bearing between moving parts to reduce wear and increase longevity. Linkage that consists of metal rubbing metal will not be approved; Tamco Series 9000 BF, or approved equal.
- D. Splitter Dampers: Fabricate dampers of same material as duct in which installed, with rolled or hemmed edges. Provide blades in ducts having a maximum side dimension under 24 inches of same gage as duct, and in ducts having a maximum side dimension 24 inches and over provide blades 2 gages heavier than duct.
- E. Manual Damper Regulators:
 - 1. For Dampers Installed in Exposed, or Accessible Concealed Ductwork: Indicating quadrant with heavy metal handle and means for locking damper in all positions. On insulated ducts, quadrant to be mounted on hat channel; channel height equal to exterior duct insulation thickness. Provide bearings at both ends of operating shaft.
 - 2. For Dampers Installed in Inaccessible Concealed Ductwork: Concealed type with indicating regulator in cast metal box with cover plate. Furnish 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. On insulated ducts, quadrant to be mounted on hat channel; channel height equal to insulation thickness. Provide bearings at both ends of

operating shaft

- F. Adjustable Vane Damper Assembly: Factory fabricated assemblies of same material as ductwork in which installed. Design assembly so either half of each blade may be adjusted independently, with blades held in position by friction pins. Install damper unit in collar gasketed with heavy felt. Design assembly to facilitate positive volume control and uniform air distribution over entire outlet.
- G. Combination Fire and Smoke Dampers and Smoke Dampers
 - 1. Air Balance Model FS2 250 or acceptable equal.
 - 2. Construction Features
 - a. Fabricate in accord with National Fire Protection Association.
 - b. Labeled and inspected by Underwriters Laboratories, Inc.
 - c. Fire resistance rating of 1-1/2 hour rated per UL Standard 555
 - d. Leakage rated damper for use in smoke control systems, with a Class II/250 degree F per UL Standard 555S.
 - e. Blades-16 gauge channel.
 - f. 20 gauge galvanized steel sleeve (20" long).
 - g. Axles-1/2" square, plated solid steel stub.
 - h. Bearings-oil impregnated bronze.
 - i. Linkage-fixed type in air stream.
 - j. Stops-18 gauge galvanized steel.
 - k. Blade Edge Seals-silicone rubber.
 - l. 120 VAC Electric Actuator. Coordinate with existing fire alarm system.
 - m. Dual position indication switches.
 - n. Damper shall be Normally Closed.
 - 3. Installation
 - a. Install at all locations shown on drawings.
 - b. Install access doors at all locations.

2.03 TURNING VANE ASSEMBLIES

- A. Fabricate vane assemblies of same material as ductwork in which installed. Provide individual hollow airfoil type vanes, rigidly connected to vane rails, with rails welded, screwed, or riveted to the ductwork.

2.04 FLEXIBLE CONNECTIONS - FABRIC

- A. Glass fabric coated with an inorganic elastomeric material, similar to Duro Dyne's Thermafab.

2.05 FLEXIBLE DUCT

- A. Conform with NFPA 90A, and UL 181, Class I (minimum R-6):
 - 1. Un-insulated: Dual element construction consisting of a corrosion resistant metal support spiral, mechanically locked to reinforced coated glass fabric, conforming to NFPA Standard 90A.
 - 2. Pre-insulated: CertainTeed's Certaflex Punchline 25; Owens-Corning's INL-25; Wiremold WCK.
 - 3. Flexible ductwork installed in unconditioned spaces shall be minimum R-8.

Refer to 230713 Duct insulation.

2.06 FLEXIBLE DUCT CLAMP

- A. Heavy duty Nylon Tie Anti-slip strap body tie, ribbed and stippled to prevent axial and lateral movement. Natural heat stabilized 6.6 nylon, high tensile strength which meets or exceeds industry and military standards (MIL-S-23190E). Temperature ratings 185 de. F max, -40 deg. F min. Positive grip locking anti-spring back tip: stainless steel (316) barb, infinitely adjustable strap. Shall be installed for a tight secure fit utilizing the manufacturer's installation tool. Manufacturer Panduit or equal.
- B. Stainless steel clamp: 9/16" wide band, plated 5/16" Hex head swivel action screw and bridge. Worm drive swivel action.

2.07 DUCT ACCESS DOORS

- A. Fabricate minimum 16 x 16 inch size, or duct size by 16" for ducts less than 16" in width, of same material and finish as duct unless otherwise shown or specified.
 - 1. For uninsulated duct designed for under 2 inches w.g.: Fabricate single panel door of same gage as duct, with all edges folded, size door to overlap opening perimeter by one inch.
 - 2. Provide door with a minimum of 4 sash locks, Ventfabrics, Inc. Ventlock No. 260 or Duro Dyne Corp. Code No. SP Series. Sash Locks shall be galvanized, cadmium plated, or aluminized steel or cast aluminum.
 - 3. For insulated duct and duct designed for 2 inches w.g. and over: Fabricate hollow metal doors in accordance with the SMACNA Manual. Fill void in doors for insulated duct with thermally equivalent insulation.
 - 4. Provide doors with a 3/4 inch wide gasket and duct sealer around all 4 sides of duct opening at joint of access door frame and duct.

2.08 PLENUM ACCESS DOORS

- A. Fabricate minimum 24" x 36" inch size, of same material and finish as plenum unless otherwise shown. Fabricate doors in accordance with the SMACNA Manual.
- B. Door design shall be minimum rating of 4.5" w.g.: Fabricate door frame of .060 aluminum extrusion with 1-1/4" wide flange, double layer door panel of 18 ga. galvanized steel (G-90) with .060 aluminum extrusion frame, fill void in door with 1" thick fiberglass insulation.
- C. Provide door with continuous type aluminum hinge.
- D. Provide 2 locking door latches: Ventfabrics, Inc., Ventlock No. 260 or Duro Dyne Corp. Code No. SP Series.
- E. Provide door with a 3/4 inch wide foam rubber gasket.
- F. Provide view port: minimum 8x8 plexiglass window.

2.09 DUCT MOUNTED SMOKE AND CARBON MONOXIDE DETECTORS

- A. Furnished by electrical contractor. Installed by HVAC contractor. Wired by electrical contractor. Coordinate locations with electrical contractor.

2.10 ROOF CURB FOR DUCT PENETRATIONS NOT DIRECTLY CONNECTED TO FANS

- A. Factory fabricated, double shell, aluminum, a minimum of 2" thick, insulated with mineral wool, or thermally equivalent insulation as approved. Fabricate curbs from minimum No. 18 gage aluminum, properly braced and stiffened to form a rigid weatherproof unit. Curbs shall be a minimum of 12" high.

PART 3 – EXECUTION

3.01 INSTALLATION - GENERAL

- A. 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.
- B. Install manual volume control dampers in all branch ducts and take-offs.
- B. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.02 TURNING VANES

- A. Install turning vanes in all rectangular, round and oval square duct construction with 90° elbows and elsewhere as indicated. Small vanes shall be installed in ducts 29" wide and smaller; larger vanes shall be installed in ducts 30" and larger.

3.03 FLEXIBLE FABRIC CONNECTORS (Installation)

- A. Make ductwork connections to air handling equipment with flexible fabric connectors. Install connectors with sufficient slack to prevent vibration transmission.
- B. Free Fabric Length: Install fabric connectors a minimum of 3 inches in length for ducts having a maximum diameter of 18 inches, or maximum side dimension of 30 inches, and a minimum of 5 inches in length for duct diameters over 18 inches or side dimensions over 30 inches.
- C. Secure fabric connectors to fans, casings and ducts as follows:
 - 1. Secure round connectors with No. 12 USS gage x 1 inch wide galvanized steel draw bands. Secure bands with bolts and nuts.
 - 2. Secure rectangular connectors with 1 inch x 1/8 inch thick flat galvanized steel bars, with screws or bolts on maximum 8 inch centers, or with approved sheet metal slip joints. Tightly crimp fabric into sheet metal joint and secure complete joint with sheet metal screws on maximum 6 inch centers.
- D. Fabric connectors may be factory pre-fabricated pre-assembled units, with minimum No. 24 USS gage metal edges, secured to fabric with double lock seams.

- E. Do not paint fabric connectors.

3.04 ACCESS DOORS

- A. Install gasketed access doors in ductwork for each motor operated damper, manually operated volume control device, smoke damper, fire damper, smoke detector, in duct heating coil and at all locations where operating parts of any kind are installed and require access and elsewhere as indicated. Access doors are not required, where a manually operated damper has an exposed damper regulator, with an indicating quadrant.
- B. Install access door accessible to service personnel, providing clear use of the door entire opening, positioned in the ductwork providing servicing of the entire fire damper with-in the duct. Access door shall not be blocked by any obstructions (i.e.: pipe, conduit, other ductwork, etc).
- C. Access doors provided to access fire dampers and smoke dampers shall be labeled with 1/2" tall letters (black paint) "FIRE DAMPER", "SMOKE DAMPER" OR "FIRE/SMOKE DAMPER". In situations where text does not fit use FD, SD or FD/SD.

3.05 CONCEALED DAMPER REGULATORS

- A. Imbed box in, and secure to back-up construction in ceiling or wall, so cover plate is flush with final surface.

3.06 FLEXIBLE DUCT

- A. Install flexible duct as per manufacturer's instructions. Provide intermediate support along horizontal runs to avoid excessive sagging. Maximum extended length to be 36".
- B. Secure each end of inner fabric of flexible duct to diffuser and ductwork with a flexible duct clamp. Secure each end of outer jacket with a flexible duct clamp independently of inner duct clamp. Nylon or Stainless steel.

3.07 FIELD QUALITY CONTROL

- A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.08 ADJUSTING AND CLEANING

- A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.
- B. Label access doors after cleaning in accordance with Division-23 section "Mechanical Identification" and with NFPA 90A.
- C. Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing".
- D. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with

manufacturer's touch-up paint.

3.09 CEILING RATED DAMPER INSTALLATION

- A. The radiation damper shall completely fill the neck of the register or diffuser. Provide thermal blankets to cover the top of the register or diffuser up to and including the balancing damper. Provide addition wire support of the ceiling grid, register or diffuser as required at all four corners of the diffuser or register. Installation of assembly shall result in a U.L. and manufacturer approved installation.
- B. Secure each end of inner fabric of flexible duct to diffuser and ductwork with a Stainless steel flexible duct clamp. Secure each end of outer jacket with a Stainless steel flexible duct clamp.

3.10 EXTRA STOCK

- A. Furnish extra fusible links to Owner, one link for every 10 installed of each temperature range; obtain receipt.

END OF SECTION 233300

SECTION 233500

DOMESTIC WATER HEAT EXCHANGERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shell-and-tube, heating-fluid-in-coil, domestic-water heat exchangers.
2. Domestic-water, heat-exchanger accessories.

B. Related Sections

1. Section 033000 - Cast-In-Place Concrete: Execution requirements for concrete housekeeping pads specified by this section.
2. Division 23 Sections: Field applied insulation for domestic water heaters.
3. Division 23 Sections: Facility Water Distribution: Supply connections to domestic water heaters.
4. Division 25 Sections: Execution requirements for electric connections specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME PTC 25 - Pressure Relief Devices.
2. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

1.3 SUBMITTALS

A. Product Data: For each type and size of heat exchanger indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Indicate heat exchanger dimensions, size of taps, and performance data. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, taps, and drains.

C. Product Certificates: Submit dimensioned drawings of water heaters indicating components and connections to other equipment and piping. Indicate pump type, capacity and power requirements.

D. Manufacturer Seismic Qualification Certification: Submit certification that heat exchangers, accessories, and components will withstand seismic forces defined in Division 15 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

- a. 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."
 - b. 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."
 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.
- E. Source quality-control test reports.
- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.
- H. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label heat-exchanger storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.5 COORDINATION

- A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of heat exchangers that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including heat exchanger, storage tank, and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period(s): From date of Substantial Completion:

- a. Shell-and-Tube, Domestic-Water Heat Exchangers:
 - 1) Tube Coil: Five years.
 - 2) Controls and Other Components: Three years.

PART 2 - PRODUCTS

2.1 SHELL-AND-TUBE, DOMESTIC-WATER HEAT EXCHANGERS

A. Circulating, Storage, Domestic-Water Heat Exchangers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 - b. Cemline Corporation.
 - c. Patterson-Kelley; a division of Harsco Corporation.
 - d. PVI Industries, LLC.
2. Description: Packaged, large-capacity, hot-water storage tank with heat-exchanger coil; circulator; controls; and specialties for heating domestic water with heating hot water in coil.
3. Flow Pattern: Standard-flow arrangement, with water from bottom of storage tank circulated across heat-exchanger coil and returned to tank. Include hot-water outlet located at top of tank and temperature sensor in tank.
4. Flow Pattern: Reverse-flow arrangement, with water from storage tank drawn across heat-exchanger coil and returned to bottom of tank. Include hot-water outlet and temperature sensor located in or at coil shell.
5. Storage-Tank Construction: ASME-code steel with 125-psig working-pressure rating. Include nozzle and head for heat-exchanger tube coil.
 - a. Configuration: Vertical
 - b. Manhole: 12 by 16 inches in sidewall of vertical storage-tank shell.
 - c. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling.
 - 1) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
 - d. Lining: Glass complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - e. Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire storage tank and nozzle except connections and controls.
 - f. Anode Rods: Factory installed, magnesium.
6. Heat-Exchanger Coil: NPS 3/4 diameter copper or copper-alloy U tubes with tube sheet and supporting baffles. Include heat-exchanger pressure rating equal to or greater than heating-fluid supply pressure.

7. Temperature Control: Adjustable temperature aquastat, mounted in storage-tank shell head unless otherwise indicated.
8. Safety Control: Automatic, high-temperature-limit cutoff device or system. Include automatic low-water cutoff device or system.
9. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
10. Gages: Factory-mounted thermometer and pressure gage.
11. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, 125-psig minimum working-pressure rating, and 225 deg F continuous-water-temperature rating.
 - a. Pump Control: Sensor for operating pump and control valve.
12. Support: Factory mounted on skids.
13. Energy Management System Interface: Normally closed dry contacts for enabling and disabling heat exchanger.

2.2 DOMESTIC-WATER, HEAT-EXCHANGER ACCESSORIES

- A. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than heat-exchanger working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- B. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than heat-exchanger working-pressure rating.
- C. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.
- D. Standard boiler water trim, 2-way temperature y-strainer control valve and isolation valve.

PART 3 - EXECUTION

3.1 HEAT-EXCHANGER INSTALLATION

- A. Install heat exchangers on concrete bases, minimum 4" high and 6" wider than the unit on all sides.
 1. Concrete base construction requirements are specified in Division 23 Sections.
- B. Install heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Install temperature and pressure relief valves in top portion of storage tank shells of heat exchangers with domestic water storage. Use relief valves with sensing elements that extend

into shells. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

- D. Install combination temperature and pressure relief valves in water piping for heat exchangers without storage. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- E. Install heat-exchanger drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for heat exchangers that do not have tank drains. Refer to Division 23 Sections for hose-end drain valves.
- F. Install thermometer on each heat-exchanger domestic-water inlet and outlet piping, and install thermometer on each heat-exchanger heating-fluid inlet and outlet piping. Refer to Division 23 Sections for thermometers.
- G. Install pressure gages on heat-exchanger heating-fluid piping. Refer to Division 23 Sections for pressure gages.
- H. Fill heat exchangers with water.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to heat exchangers to allow service and maintenance. Arrange piping for easy removal of heat exchangers.
- C. Ground equipment according to Division 26 Sections.
- D. Connect wiring according to Division 26 Sections.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace heat exchangers that do not pass tests and inspections and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 233713 DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

Metal Ductwork: Section 233113

1.03 REFERENCES

NFPA: National Fire Protection Association.

SMACNA: Sheet Metal and Air Conditioning (Sub)Contractors National Association, Inc.

UL: Underwriters Laboratories, Inc.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, diagrams, standard schematic drawings, and installation instructions for each manufactured product. Submit SMACNA Figure Numbers for each shop fabricated item.
- B. Provide a room schedule, to include: listing of all rooms (room name or number), equipment identification tag, CFM, face and inlet neck size, quantity required and corresponding manufacturers' model number.
- C. Samples: When requested by the Engineer, submit one complete unit for each type of proposed air inlet and outlet device. Approved samples will be delivered to the job site for installation.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Unless otherwise shown or specified, comply with the applicable requirements of the following:
 - a. SMACNA: Gages of materials, fabrication, sealing, and installation shall be in accordance with the HVAC Duct Construction Standards Manual.
 - b. NFPA: Standards No.'s 90A, 90B, 91, 96, and 101.
 - c. UL: Standards No. UL555.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Nailor Industries, Inc.
Carnes
Metalaire
Titus
Tuttle

2.02 GRILLES AND REGISTERS

- A. Fabricate grille and register faces, and frames installed in shower rooms, locker rooms, toilet rooms, can washing, dishwasher, food serving, and kitchens of aluminum with an etched and acrylic coated finish.
- B. Unless otherwise specified, fabricate all other grille and register faces, and frames of steel with factory applied finish as follows:
 - 1. Prime coat for installation in walls and gypsum board, hard plaster or acoustic plaster ceilings specified to be painted.
 - 2. Baked-on white enamel for installation in splined acoustic ceilings, metal pan ceilings and suspended lay-in tile ceilings.
- C. Provide frames for each grille and register except as follows:
 - 1. Grilles and registers installed directly in exposed uninsulated ductwork.
 - 2. Grilles or registers designed for installation in suspended lay-in tile ceilings or suspended combination lay-in and splined tile grid ceilings.
 - 3. Grilles or registers installed in gypsum board walls or ceilings.
 - 4. Grilles or registers installed in metal pan ceilings.
- D. Exhaust or Return Grilles: Fixed 40 degree or 45 degree single deflection type, consisting of a heavy formed face with face bars on nominal 0.66 inch or 0.75 inch centers, installed in a No. 20 gage frame of same material as bars.
 - 1. Sidewall grilles shall have horizontal face bars.
 - 2. Manufacturers:
 - a. Carnes Model #RSLAH (Steel), #RALAH (Aluminum);
 - b. Anemostat Model #S3HD (Steel), #X35VD (Aluminum);
 - c. Titus Model #350 RL (Steel), #350FL (Aluminum);
 - d. Tuttle & Bailey #T70D (Steel), #A70D (Aluminum).
- E. Supply Registers:
 - 1. Face: Adjustable double deflection type, consisting of a heavy formed face, with rear bars or vanes installed in a No. 20 gage frame, of same material as bars or vanes, with face and rear bars or vanes on nominal 0.66 inch or 0.75 inch centers; individually adjustable and front pivoting to any desired setting, by means of a key. Furnish one adjustment key per every 5 registers.
 - 2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades, and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish as approved by the

Engineer.

3. Manufacturers:

- a. Carnes Model #RTDAV (Steel), #RNDV (Aluminum);
- b. Anemostat Model #S2VO (Steel), #X2VO (Aluminum);
- c. Titus Model #300RS5 (Steel), #300FS5 (Aluminum);
- d. Tuttle Model #T647 (Steel), #A647 (Aluminum).

F. Exhaust or Return Registers:

1. Face: Fixed 40 degree or 45 degree fixed single deflection type, consisting of a heavy formed face with face bars on nominal 0.66 inch or 0.75 inch centers, installed in a No. 20 gage frame, of same material as bars.
 - a. Sidewall registers shall have horizontal face bars.
2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish acceptable to the Engineer.
3. Acceptable Manufacturers:
 - a. Carnes Model #RTLAH (Steel), #RNLAH (Aluminum);
 - b. Anemostat Model #S35HOD (Steel), #X35VOD (Aluminum);
 - c. Titus Model #350RL5 (Steel), #350FL5 (Aluminum);
 - d. Tuttle Model #T77D (Steel), #A77D (Aluminum).

G. Linear Return Register:

1. Extruded aluminum linear grille, 3" wide with c" blades on ¼" centers in extruded aluminum frame with 1" flange. Grille shall be designed for installation in a sidewall application with spring-clip retainers. Blades shall be designed for 0° deflection. Finish to be brushed aluminum.
2. Damper Assembly: Opposed multi-blade type, consisting of frame, blades and key operated movement of the locking type, with operator projecting through frame. Furnish operators which are removable or permanently secured in place, as directed. Fabricate damper assemblies for use with aluminum or stainless steel register faces of aluminum with an etched or acrylic coated finish, and for use with factory painted register faces, or equivalent finish as approved by the Engineer.
3. Manufacturer: Carnes Model #CTQBD.

H. Frames for Registers and Grilles:

1. Fabricated from a minimum of No. 20 USS gage stamped or rolled steel, or extruded aluminum, to match material and finish of mating grille or register face. Exposed joints shall be welded and ground flush, or corner joints completely closed with neatly welded backtrim. Furnish frames complete with felt or sponge rubber gaskets on all four sides, except when frames are used as plaster stops.

2.03 AIR DIFFUSERS

- A. Square, rectangular or linear type as indicated. Do not use neck or duct connection sizes indicated to size diffusers.
- B. Furnish aluminum diffusers with an etched and clear acrylic coated finish where installed in shower, toilet rooms, locker rooms, dishwasher, food serving and kitchens.
- C. In general, fabricate diffusers of steel with a white baked enamel finish, or aluminum with an etched and clear acrylic coated finish, unless otherwise specified. Roll or round and reinforce all exposed edges of diffusers and provide readily removable internal diffuser parts to permit cleaning and access to ducts. Design removable parts and assemblies so that they cannot be reassembled in a manner which would produce an incorrect air distribution pattern. Secure internal assemblies with fasteners, which will allow their removal without use of special tools.
- D. Circular, Square and Rectangular Diffusers: Complete with volume control damper (and adjustable equalizing grid), fabricated of same material as diffuser. Damper shall be adjustable by means of operator handle and rod device, which is designed to be locked in any position. Diffusers installed in plaster ceilings shall have plaster grounds and anti-smudge rings of same material and finish as diffuser, or diffuser shall have specially designed outer rings or rims with contours of sufficient depth below ceiling line to minimize smudging.
 - 1. Surface Mounted Diffuser: Manufacturers
 - a. Carnes Model #SKFA w/KXKA (Steel), #SAFA w/KXUA (Aluminum);
 - b. Anemostat Model #SDF w/DOB (Steel), #D w/DOB (Aluminum);
 - c. Titus Model #TIC-1 w/AG-95 (Steel), TIC-AA-1 w/AG-95 (Aluminum);
 - d. Tuttle Model #ME W/OBD (Steel), #AME W/A7.
 - 2. Stamped for T-Bar Diffuser: Manufacturers
 - a. Carnes Model #SFTB w/KXMB (Steel), #SFAB (Aluminum);
 - b. Anemostat Model #EPL w/LD (Steel), #EPL (Aluminum);
 - c. Titus Model #TMS-3 w/AG-75 (Steel), #TMS-AA (Aluminum);
 - d. Tuttle Model #1400 W/T4 (Steel), #A1400 (Aluminum).
- E. Linear Diffusers: Complete with air flow and pattern control valve, adjustable to any desired setting, fabricated of same material and with same finish as diffuser.
 - 1. Manufacturers: Aluminum Construction Standard
 - a. Carnes Model #CH
 - b. Anemostat Model #SLAD
 - c. Titus Model #ML
 - d. Tuttle Model Imperialine 6000/7000

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Unless otherwise shown or specified, install the Work of this section in accordance with the manufacturer's printed installation instructions and the SMACNA Manual.
- B. Ductwork seen behind registers, in other words; ductwork visible through a register

(inside the duct) shall be painted using one coat of flat black metal paint (after proper surface cleaning). Paint coverage shall be that no unpainted duct will be seen. This applies to all grilles, registers and diffusers.

END OF SECTION 233713

SECTION 235100**BREECHINGS, CHIMNEYS, AND STACKS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Listed double-wall vents.
- B. Related Sections include the following:
 - 1. Section 235216 "Condensing Boilers" for venting requirements by Boiler Manufacturer.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Special gas vents.
- B. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers, and location and size of each field connection and details of the method of support.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Manufacturer Seismic Qualification Certification: Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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."

- b. 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."
 - 2. Dimensioned Outline Drawings of Breeching, Chimneys, and Stacks: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of anchorage devices on which the certification is based and their installation requirements.
- C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.
- D. Qualifications: Sheet metal and structural steel Work: Performed by skilled mechanics regularly engaged in their respective trades.
- E. Regulatory Requirements: Comply with the applicable requirements of the National Fire Protection Association and the Sheet Metal and Air Conditioning Contractors National Association, unless otherwise shown or specified.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.
 - 1. Warranty Period: **15** years from date of Substantial Completion.

1.8 DEFINITIONS

- A. Combustible Material: Material made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that will ignite and burn, whether flameproofed or not, or whether plastered or unplastered.

PART 2 - PRODUCTS

2.1 LISTED SPECIAL GAS VENTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
 - 1. Heat-Fab, Inc.
 - 2. Metal-Fab, Inc.
 - 3. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
 - 4. Z-Flex; Flexmaster Canada Limited.
- D. Description: Double-wall metal vents tested according to UL 1738 and rated for 480 deg F (248 deg C) continuously, with positive or negative flue pressure complying with NFPA 211.
- E. Construction: Inner shell and outer jacket separated by at least a 1/2-inch (13-mm) airspace.
- F. Inner Shell: ASTM A 959, Type 29-4C stainless steel.
- G. Outer Jacket: Stainless steel.
- H. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - 1. Termination: Stack cap designed to exclude minimum 90 percent of rainfall.
 - 2. Termination: Round chimney top designed to exclude minimum 98 percent of rainfall.
 - 3. Termination: Exit cone with drain section incorporated into riser.

2.2 GUYING AND BRACING MATERIALS

- A. Cable: Three galvanized, stranded wires of the following thickness:
 - 1. Minimum Size: 1/4 inch (6 mm) in diameter.
 - 2. For ID Sizes 4 to 15 Inches (100 to 381 mm): 5/16 inch (8 mm).
 - 3. For ID Sizes 18 to 24 Inches (457 to 610 mm): 3/8 inch (9.5 mm).
 - 4. For ID Sizes 27 to 30 Inches (685 to 762 mm): 7/16 inch (11 mm).

5. For ID Sizes 33 to 36 Inches (838 to 915 mm): 1/2 inch (13 mm).
 6. For ID Sizes 39 to 48 Inches (990 to 1220 mm): 9/16 inch (14.3 mm).
 7. For ID Sizes 51 to 60 Inches (1295 to 1524 mm): 5/8 inch (16 mm).
- B. Pipe: Two galvanized steel, NPS 1-1/4 (DN 32).
- C. Angle Iron: Two galvanized steel, 2 by 2 by 0.25 inch (50 by 50 by 6 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

- A. Listed Type B and BW Vents: Vents for certified gas appliances.
- B. Listed Special Gas Vent: Condensing gas appliances.

3.3 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- B. Seal between sections of positive-pressure vents and grease exhaust ducts according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- D. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
- E. Lap joints in direction of flow.
- F. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
- G. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
- H. Erect stacks plumb to finished tolerance of no more than 1 inch out of plumb from top to bottom.

3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 235100

SECTION 235216
CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract apply to this section, including General and Supplementary Conditions and Division 01 Specification Sections.

1.2 SUMMARY

- A. This section includes packaged, factory-fabricated and assembled, gas-fired, fire-tube condensing boilers, trim and accessories for generating hot water.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties and accessories.
 - 1. Prior to flue vent installation, engineered calculations and drawings must be submitted to Architect/Engineer to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted boiler.
- B. Efficiency Curves: At a minimum, submit efficiency curves for 100%, 50% and 7% input firing rates at incoming water temperatures ranging from 80°F to 160°F.
- C. Pressure Drop Curve. Submit pressure drop curve for the following flow ranges per designated capacities below

1500 MBH: 25 - 350 GPM
- D. Shop Drawings: For boilers, boiler trim and accessories include:
 - 1. Plans, elevations, sections, details and attachments to other work
 - 2. Wiring Diagrams for power, signal and control wiring
- E. Source Quality Control Test Reports: Reports shall be included in submittals.
- F. Field Quality Control Test Reports: Reports shall be included in submittals.
- G. Operation and Maintenance Data: Data to be included in boiler emergency, operation and maintenance manuals.
- H. Warranty: Standard warranty specified in this section
- I. Other Informational Submittals:

1. ASME Stamp Certification and Report: Submit "H" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.

1.4 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** The manufacturer must have been regularly engaged in the manufacture of condensing hydronic boilers for not less than thirty (30) years. The manufacturer must be headquartered in North America and manufacture pressure vessels in an ASME-certified facility wholly owned by the manufacturer. The specifying engineer, contractor and end customer must have the option to visit the factory to witness test fire and other relevant procedures.
- B. **Electrical Components, Devices and Accessories:** Boilers must be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. **AHRI Performance Compliance:** Condensing boilers must be rated in accordance with applicable federal testing methods and is capable of achieving the energy efficiency and performance ratings within prescribed tolerances.
- D. **ASME Compliance:** Condensing boilers must be constructed in accordance with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers".
- E. **ASHRAE/IESNA 90.1 Compliance:** Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- F. **DOE Compliance:** Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
- G. **UL Compliance:** Boilers must be tested for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.
- H. **NOx Emission Standards:** When installed and operated in accordance with manufacturer's instructions, the following condensing boiler models shall comply with the NOx emission standards outlined in South Coast Air Quality Management District (SCAQMD), Rules 1146, 1146.1, or 1146.2; and the Texas Commission on Environmental Quality (TCEQ), Title 30, Chapter 117, and Rule 117.465 or the NOx emissions referenced below:
 - 9 ppm NOx corrected to 3% oxygen at all firing rates when firing on natural gas

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Anchor unit to concrete base. Concrete, reinforcement and formwork requirements are specified in Division 03.

1.6 WARRANTY

- A. Standard Warranty: Boilers shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Fire-Tube Condensing Boilers
 - a. The pressure vessel/heat exchanger shall carry a 15-year from shipment, non-prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects or workmanship.
 - b. The pressure vessel is warranted against failure due to thermal shock for the lifetime of the boiler provided the boiler is installed, controlled, operated and maintained in accordance with the operation and maintenance manual.
 - c. The burner shall be conditionally guaranteed against any failure for (5) five years from shipment.
 - d. Manufacturer labeled control panels are conditionally warranted against failure for (3) three years from shipment.
 - e. All other components, with the exception of the igniter, flame detector and O₂ sensor, are conditionally guaranteed against any failure for (2) two years from shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. This specification is based on the Benchmark Platinum Series boilers that are fitted with Edge [ii] control as manufactured by AERCO International Inc. Equivalent units and manufacturers must meet all performance criteria, and will be considered upon prior approval.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide AERCO International, Benchmark Platinum Series Boiler with Edge [ii] control:
 - 1. BMK 1500
 - 2. Approved Equals:
 - a. AERCO Benchmark boilers BMK
 - b. Bosch Buderus SB Series
 - c. Superior Boiler - Creek Series
 - d. Simons Boilers - FTC Titan
 - e. Request for substitutions will be considered in accordance with provisions of Section 235216 - Condensing Boilers, in writing no less than 30 days prior to bid date.
 - f. Note: Water tube boilers are not permitted without written approval. Request and written approval must be submitted and obtained 14 days prior to bid date.

2.2 CONSTRUCTION

- A. Description: Boiler shall be either natural gas, propane or dual fuel fired (nat. gas/propane) fully condensing fire tube design. It shall be design to operate in variable primary or primary secondary piping configuration. Power burner shall have full modulation, discharge into a positive or negative pressure vent and the minimum firing rate shall not exceed the following per model:

- BMK1500: 75,000 BTU/hr input

Boilers that have an input greater than what is specified above at minimum fire will not be considered. Boiler efficiency shall increase with decreasing load (output), while maintaining setpoint. Boiler shall be factory-fabricated, factory-assembled and factory-tested, fire-tube condensing boiler with heat exchanger sealed pressure-tight, built on a steel base, including insulated jacket, flue-gas vent connections, combustion-air intake connections, water supply, dual inlet returns condensate drain connections, and controls.

- B. Heat Exchanger: The heat exchanger shall be constructed of 439 stainless steel fire tubes and tubesheets, with a one-pass combustion gas flow design. The fire tubes shall be 1/2" or 5/8" OD, with no less than 0.049" wall thickness. The upper and lower stainless steel tubesheet shall be no less than 0.25" thick. The pressure vessel/heat exchanger shall be welded construction. The heat exchanger shall be ASME stamped for a working pressure not less than 150 psig. Access to the tubesheets and heat exchanger shall be available by burner and exhaust manifold removal. Minimum access opening shall be no less than 8 inch diameter.

- C. Pressure Vessel: The pressure vessel shall have a maximum water volume per each model as listed below:

- 44 gallons (166.6 liters)

The boiler water pressure drop shall not exceed the following per model size:

- 3 psig @ 170 gpm

The boiler water connections shall be flanged 150-pound, ANSI rated.

- 4 inch flange

The pressure vessel shall be constructed of ASME SA53 carbon steel, with a 0.25 inch thick wall and 0.50 inch thick upper head. Inspection openings in the pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The boiler shall be designed so that the thermal efficiency increases as the boiler firing rate decreases.

- D. Dual Returns: The boiler shall include dual return connections for low and high return temperature zones for added flexibility and thermal efficiency optimization. The boiler shall not have a minimum flow rate requirement through either return connection as long as the specified minimum flow of the boiler is met through a combination of the two return connections. Boilers with single return will be deemed unacceptable.

- E. Modulating Air/Fuel Valve and Burner: The boiler burner shall be capable of the following firing turndown ratios without loss of combustion efficiency or staging of gas valves. The turndown ratios shall be as follows and are based on BTU size:

- 1500 MBH: 20:1

The burner shall not operate above 7.5% oxygen level or 55% excess air. The burner shall produce less than 13 ppm of NO_x, under standard calibration, corrected to 3% excess oxygen when firing on natural gas. The burner shall be metal-fiber mesh covering a stainless steel body with spark or proven pilot ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. The modulating motor must be linked to both the gas valve body and air valve body with a single linkage. The linkage shall not require any field adjustment. A variable speed cast aluminum pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.

F. Fuel: The boiler shall use one of the following gas train options:

1. Natural gas or propane: The unit gas train shall be specifically designed and calibrated for a single predetermined fuel. The gas train shall be a ventless gas train.
2. Dual Fuel Capability. Dual fuel boiler (natural gas/propane) shall include a combustion system capable of operating on both Natural Gas and Propane. The boiler efficiency and turndown shall remain unchanged regardless of fuel source. The dual fuel system shall incorporate independent natural gas and propane gas trains and a fuel selector switch. This switching mechanism shall be such that it shall not be possible to flow both fuels simultaneously. The unit shall be calibrated to run on both fuel sources at start-up. No additional re-calibration shall be required when switching between fuel sources for a period of one year from the initial calibration

G. Minimum boiler efficiencies shall be as follows at a 20°F delta-T:

EWT	100% Fire	50% Fire	7% Fire
160 °F	86.5%	87%	87%
140 °F	87%	87.5%	87.5%
120 °F	88.5%	89%	90%
100 °F	93.2%	94.5%	95.2%
80 °F	95.6%	96.8%	98.2%

H. Exhaust Manifold: The exhaust manifold shall be of corrosion resistant cast aluminum or 316 stainless steel with the following diameter flue connections:

1. 6 inch

The exhaust manifold shall have a collecting reservoir and a gravity drain for the elimination of condensation.

I. Blower: The boiler shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.

1. Motors: Blower motors shall comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require a motor to operate in the service factor range above 1.0.

- J. Ignition: Ignition shall be via spark or proven pilot ignition with 100 percent main-valve shutoff and electronic flame supervision.
- K. Combustion Air: The boiler shall be designed such that the combustion air is drawn from the inside of the boiler enclosure, decoupling it from the combustion air supply and preheating the air to increase efficiency.
- L. Combustion Air Filter: The boiler shall be equipped with an automotive high flow air filter to ensure efficient combustion and unhindered burner components operation.
- M. Enclosure: The plastic and sheet metal enclosure shall be fully removable, allowing for easy access during servicing.
- N. O₂ sensor located in the Combustion Chamber: The boiler shall be equipped with an Oxygen sensor. The sensor shall be located in the boiler combustion chamber. Boilers without Oxygen sensor or boilers with an Oxygen sensor in the exhaust shall not be acceptable due to measurement estimation and performance accuracy.

2.3 CONTROLS

- A. The boiler shall have an integrated boiler control that is capable of operating the boiler and associated accessories including but not limited to: its pumps, valves and dampers.
 - 1. The control shall have a 5 inch color touch screen display as well as six function buttons that are separate from the display. User shall have the ability to navigate the menus via touchscreen or navigation buttons. Controls not equipped with navigation button options shall not be permitted.
 - 2. The control shall be equipped with a multi-color linear LED light to indicate the level of firing and/or air/fuel valve position.
 - 3. The control shall display two temperatures using two dedicated three-digit seven-segment displays.
 - 4. The control shall offer an Enable/Disable toggle switch as well as two buttons for Testing and Resetting the Low Water Cutoff.
- B. The Manager designated boiler control shall be capable of the following functions without the need for additional external controls:
 - 1. Sequence up to 16 boilers,
 - 2. Control boiler variable speed or single speed pumps and/or modulating motorized valves,
 - 3. Operate or modulate a variable or single speed system pump or rotate two system pumps,
 - 4. Control and communicate with up to 6 SmartPlate domestic water heaters and their domestic hot water pump,
 - 5. The control shall connect to other plant boiler controls using RS485 and communicate using Modbus protocol.
- C. The control system shall be segregated into three components: “Edge [ii]” Control Panel, Power Panel and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized.
- D. The control panel shall consist of seven individual circuit boards using surface-mount technology in a single enclosure. Each board shall be individually field replaceable. These circuit boards shall include:

1. A microcontroller board with integrated 5 inch touchscreen color display providing the user interface.
 2. A 7-segment display board. This board includes two 3-digit 7-segment displays. These displays shall be used to view a variety of temperature sensor values and operating and startup function status.
 3. An Interface board connects the microcontroller board to internal components using ribbon cables.
 4. An electric low-water cutoff board connects to the test and manual reset functions on the microcontroller board.
 5. A power supply board is designed to provide the different DC voltages to the rest of the boards. It also acts as voltage regulator and reduce power noise.
 6. An ignition and combustion board. This board controls the air/fuel valve and Safety Shutoff Valve, flame status and ignition transformer
 7. A connector board used to connect all external electrical connection.
- E. Combination plant: The managing boiler control shall be capable of setting and managing a combination plant that consist of up to two groups of boilers, their swing boilers and swing valves. The control shall be capable of performing all the listed features without the need for any additional controls. The use of additional controls to achieve any of these functionalities shall be prohibited to simplify installation and plant management. The combination plant control shall have the following capabilities:
1. The control shall operate one group of boilers for heating and another group of boilers for domestic hot water using plate heat exchangers or indirect tanks.
 2. The control shall manage and rotate the lead boiler in each of the two groups independent of the other group.
 3. The control shall be capable of managing one or two swing boilers and their motorized swing valves to direct the output of the swing boiler(s) to one of the two groups based on the plant priority settings. The control shall also connect to the header and return sensors for each of the two groups of boilers and use those values to manage the set point for each group.
 4. The control shall offer two independent logics that run simultaneously managing each group of boilers. Each boiler group logic shall have its temperature values, setpoints, PID and feedback parameters that is independent of the other group settings and parameters.
- F. System Pump lead/lag rotation: The control shall be capable of operating two system pumps. It shall rotate the lead pump based on user time setting. The use of an external pump lead-lag control shall not be permitted unless function is performed by building management system.
- G. Variable Speed Pump: The control shall be capable of modulating a variable speed pump. It shall modulate the pump based on the boiler firing rate, the boiler plant firing rate, or based on the return header temperature differential from supply water temperature on a primary secondary piping application.
- H. Minimum number of boiler plant open valves: The control shall manage the minimum number of boiler motorized valves to reduce variable speed pump flow and energy used. The control shall offer a setting to control the number of valves open during low load and standby operation. Manufacturers without this feature shall offer additional pump controller and a smaller single speed pump to run during the low load and standby periods.

- I. Control settings transfer using USB: The control shall simplify and significantly lessen startup and boiler setting time by being able to use a USB flash drive to copy settings from one boiler to another boiler. Installers shall use successfully preconfigured boiler settings in their portfolio to newly installed boilers.
- J. Combustion calibration: The control shall offer at least 5 calibration points. The use of less than 5 calibration points is not permitted to improve overall system efficiency under all firing rates. Each combustion calibration point shall operate with 5 to 7% O₂ levels to improve operating efficiency. Deviating away from these values shall not be acceptable.
- K. Assisted Combustion Calibration: The control shall offer an assisted combustion calibration feature to help reduce setup time and improve setup accuracy. The assisted combustion calibration shall adjust the O₂ level at each calibration point to help keep O₂ level within allowable efficiency. The control shall log, date and time stamp the calibrated point combustion values of O₂ and allow the user to log NO_x, CO and flame strength. The control shall check these values against manufacturer allowable combustion values and color identify values out of manufacturer acceptable ranges. As an additional capability, the control shall also have the ability to perform manual combustion calibration. Not having Assisted Combustion Calibration function shall be prohibited.
- L. Valve Balancing: To help simplify installation and as part of a boiler plant, the control shall be capable of controlling an electronic modulating motorized valve for each of the boilers using the manager boiler control. It shall have a built-in logic to provide a maximum flow using an adjustable valve opening percentage point for each boiler. The control shall be capable of closing any valve that has an off boiler. If all boilers are off, the control shall keep at minimum one valve open to protect pumps.
- M. Building Automation: The control shall be able to communicate to Building Management Systems using BACnet and Modbus without the use of external gateways. The control shall be able to communicate over each of the two protocols using IP as well as RS485. The use of external gateways is not acceptable. The control shall be able to communicate to the building management system using:
 - 1. BACnet MS/TP and BACnet IP/Ethernet. When communicating over BACnet IP, the control shall offer an additional layer of IP security by mapping all control BACnet IP communication to the BACnet server's IP and MAC addresses. Not having this level of security shall deem the IP communication insecure and shall not be acceptable.
 - 2. Modbus RTU and Modbus IP.
- N. Unit and Plant Status: The control shall provide a quick view of the unit status and plant status.
 - 1. The unit status screen shall provide temperature setpoint, all water inlet and outlet and supply air and exhaust temperature sensors' values. It shall also provide unit current and target firing rates. Additional screens shall display unit run hours, cycle count and average cycles per hour.
 - 2. The plant status screens shall provide plant temperature setpoint, plant water supply and return temperatures, outdoor temperature and domestic hot water setpoint and current temperatures. Additionally, a status screen shall show the boiler status of each plant unit, plant firing rate.
 - 3. Unit and Plant event history: The manager control shall display the last 500 historical events per plant or 200 historical events for single unit installations.

- O. Software update: The control shall be capable of field software updates without a need for hardware component(s) replacement. This shall be performed either using software on a USB flash drive or via Internet connection. The software update mechanism shall be performed by a trained technician. The software update menus shall be secured using a password level. After the software update, the control shall retain all of its prior field settings.
- P. Copy settings from one boiler to the other: To significantly reduce installation time by reducing long repetitive work, the control shall have the capability of saving its settings to a USB flash drive. In addition, the control shall have the ability of copying new settings from a flash drive.
- Q. Programmable Inputs and Outputs: The control shall be equipped with multiple relay and analog outputs and dry contact and analog inputs. Each shall be field programmable to meet installation needs. The following I/O options shall be available:
 - 1. Relay outputs: There shall be two output relays that are programmable. The following relay functions shall be selectable:
 - a. Swing Valve 2
 - b. System Pump
 - c. Summer Pump
 - d. Multi-temperature pump
 - e. Pump2
 - f. Louver
 - 2. Inputs and interlocks: The following control functions shall be available:
 - a. Flow input
 - b. Damper end switch input
 - c. Louver end switch input
 - 3. Analog output: There shall be three analog outputs that are programmable. The control shall have configurable analog outputs that can be used as one of the following options:
 - a. Boiler pump
 - b. Domestic hot water variable speed pump
 - c. Valve
 - d. Fire rate
 - 4. Analog input: There shall be three analog inputs that are programmable. The control shall have configurable analog inputs that can be used as one of the following options:
 - a. Remote setpoint
 - b. Smart Plate valve position
 - c. Domestic hot water variable speed pump flow
- R. Backup boiler: The control shall be able to operate a lower efficiency back up boiler during peak periods when main plant boilers are at or close to peak load.
- S. Communication with SmartPlate: The control shall be capable of controlling and monitoring one or multiple plate heat exchanger(s). It shall be able to:
 - 1. Change the domestic hot water temperature setpoint and read its current temperatures.
 - 2. Monitor 3-way valve position.
 - 3. Control the operation of the domestic hot water pump.
- T. The controls shall annunciate boiler and sensor status and include extensive self-diagnostic capabilities.
- U. The control panel shall incorporate:

1. Setpoint High Limit: Setpoint high limit allows for a selectable maximum boiler outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degree selectable band from the desired maximum boiler outlet temperature.
 2. Setpoint Low Limit: Allow for a selectable minimum operating temperature.
 3. Failsafe Mode: Failsafe mode allows the boiler to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.
- V. The boiler control system shall incorporate the following additional features for enhanced external system interface:
1. System start temperature feature
 2. Pump delay timer
 3. Auxiliary start delay timer
 4. Auxiliary temperature sensor
 5. Analog output feature to enable simple monitoring of temperature setpoint, outlet temperature or fire rate
 6. Remote interlock circuit
 7. Delayed interlock circuit
 8. Easy Setup by providing simplified menu quick settings to expedite plant and boiler setup
 9. Delta-T Limiter
 10. Freeze protection
 11. Fault relay for remote fault alarm
 12. Warm-weather shutdown
 13. The control shall offer multi-level user security access using different passwords. For additional security, the passwords shall expire if control display was not touched for an extended period 30 minutes.
- W. Each boiler shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each boiler shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD-1.
- X. O₂-Trim or AERtrim: Each boiler shall be equipped with the patented AERtrim system, an advanced O₂-trim system for condensing boiler applications. The system shall utilize a low cost reliable automotive O₂ sensor that measures and monitors the oxygen content of the exhaust gases. The system shall adjust the blower speed to maintain optimal air-fuel ratios in the event of any site condition changes (air density, gas pressure, BTU content, etc.). The system shall have the following capabilities:
1. Self-Diagnostics
 - a. System Status and Error Messages
 - b. When excessive trimming is occurring
 - c. When O₂ sensor has fallen out of calibration
 2. Adjustable parameter settings
 - a. O₂ target and range to meet site requirements
 - b. Schedule daily or weekly self-diagnostics

Output of O₂ information shall be displayed on the Edge [ii] control panel.

The O₂ sensor shall be installed through the unit's burner plate and measure the oxygen content directly within the unit's combustion chamber.

Boilers without an equivalent O₂ trim will be deemed unacceptable. Due to the moisture content of flue gases from condensing boilers, placing the O₂ sensor in the exhaust manifold or stack will be deemed unacceptable.

Boilers which require their O₂ sensor be changed annually will be deemed unacceptable.

- Y. Each boiler shall be onAER ready with a standard Ethernet port and include a 5 year onAER subscription at no additional charge. AERCO's onAER service grants the user online access to real time operation and status of their system plant from any computer, tablet or mobile device along with the following capabilities:
1. Efficiency status and trends
 2. O₂ levels
 3. Efficiency and performance optimization tips
 4. Preventative Maintenance alerts and scheduling
 5. Predictive Maintenance algorithms.
 6. Warning and error messages
 7. Weekly or monthly performance and status reports
 8. Manage multiple boiler plants or buildings
 9. Customizable dashboard
 10. Add email contacts for alerts and reports, including local AERCO trained technicians
 11. Manage and store startup, maintenance and service documentation

The boiler manufacturer shall be able to provide a network hub or a network switch to connect up 16 boilers to an online network.

- Z. Each boiler shall have integrated Boiler Sequencing Technology (BST), capable of multi-unit sequencing with lead-lag functionality and parallel operation. The system will incorporate the following capabilities:
1. Efficiently sequence 2 units on the same system to meet load requirement.
 2. Integrated control and wiring for seamless installation of optional modulating motorized valve. When valves are utilized, the system shall operate one motorized valve per unit as an element of load sequencing. Valves shall close with decreased load as units turn off, with all valves open under no-load conditions.
 3. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize run hours among active units.
 4. Option to manually designate lead and last boiler
 5. Designated manager control, used to display and adjust key system parameters.
 6. Automatic bump-less transfer of master function to next unit on the chain in case of designated master unit failure; master/slave status shall be shown on the individual unit displays.

2.4 ELECTRICAL POWER

- A. Controllers, Electrical Devices and Wiring: Electrical devices and connections are specified in Division 26 sections.

- B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the boiler.
- C. Electrical Characteristics:

Electrical Specifications	Models
	BMK750-2000
Voltage	120 V
Phase	1
Frequency	60 Hz
Full Load Current	13-16 Amps

2.5 VENTING

- A. The boiler shall be capable of venting in Polypropylene venting material. The exhaust vent must be UL Listed for use with Category II, III and IV appliances and compatible with condensing flue gas service. UL-listed vents of Polypropylene or Al 29-4C stainless steel must be used with boilers.
- B. The minimum exhaust vent duct size for each boiler is six inch (BMK750 - 1500), diameter.
- C. Combustion-Air Intake: Boilers shall be capable of drawing combustion air from the outdoors via a metal or PVC duct connected between the boiler and the outdoors.
- D. The minimum ducted combustion air duct size for each boiler is six inch (BMK750 - 1500) diameter.
- E. Common vent and common combustion air must be an available option for boiler installation. To improve system efficiency, multi-boiler system shall utilize sequencing logic with common venting as well as individual boiler venting configuration. Manufacturers not allowing parallel modulation for common shall not be acceptable. Consult manufacturer for common vent and combustion air sizing.
- F. Follow guidelines specified in manufacturer's venting guide.

2.6 SOURCE QUALITY CONTROL

- E. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve combustion efficiency. Perform hydrostatic testing.
- F. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
 - 1. If boilers are not factory assembled and fire-tested, the local vendor is responsible for all field assembly and testing.
- G. Allow Owner access to source quality-control testing of boilers. Notify Architect fourteen days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations and piping and electrical connections to verify actual locations, sizes and other conditions affecting boiler performance, maintenance and operations.
 - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- F. Examine mechanical spaces for suitable conditions where boilers will be installed.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install boilers level on concrete bases. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.
- B. Install gas-fired boilers according to NFPA 54.
- C. Assemble and install boiler trim.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to boiler to permit service and maintenance.
- C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- D. Connect gas piping to boiler gas-train inlet with unions. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- E. Connect hot-water piping to supply and return boiler tapings with shutoff valve and union or flange at each connection.
- F. Install piping from safety relief valves to nearest floor drain.
- G. Boiler Venting

1. Kit: Complete system, ASTM A959, Type 29-4C stainless steel or polypropylene (PPs), pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant. Vent system shall meet category IV venting requirements.
 2. B. Combustion-Air Intake: Complete system, stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.
 3. Connect venting full size to boiler connections. [Comply with requirements in Division 23 Section "Breechings, Chimneys and Stacks."]
- H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections
1. Perform installation and startup checks according to manufacturer's written instructions.
 2. Perform hydrostatic test. Repair leaks and retest until no leaks exist.
 3. Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating setpoints and high- and low-limit safety setpoints of fuel supply, water level and water temperature.
 - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Occupancy Adjustments: When requested within 2 months of date of Substantial Completion, provide on-site assistance adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- E. Performance Tests:

The boiler manufacturer is expected to provide partial load thermal efficiency curves. These thermal efficiency curves must include at least three separate curves at various BTU input levels. If these curves are not available, it is the responsibility of the boiler manufacturer to complete the following performance tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of boilers.
 - a. Test for full capacity.
 - b. Test for boiler efficiency at [low fire, 20, 40, 60, 80, 100, 80, 60, 40 and 20] percent of full capacity. Determine efficiency at each test point.
4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Architect in advance of test dates.
8. Document test results in a report and submit to Architect.

END OF SECTION 235216

SECTION 236400

AIR-COOLED SCREW CHILLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract apply to this section, including General and Supplementary Conditions and Division 01 Specification Sections.

1.2 SUMMARY

- A. Microprocessor controlled, air-cooled liquid chiller for outdoor installation, utilizing variable speed screw compressors on all models, and utilizing low sound variable speed fans on all mid and high-tier models.

1.3 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with AHRI (Air-Conditioning, Heating and Refrigeration Institute) Standard 550/590 (U.S.A.) latest edition and all units shall meet requirements of ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) Standard 90.1-2016.
- B. Unit construction shall comply with ASHRAE 15 Safety Code, UL (Underwriters Laboratories) 1995, and ASME (American Society of Mechanical Engineers) applicable codes (U.S.A. codes).
- C. The management system governing the manufacture of this product is ISO (International Organization for Standardization) 9001:2015 certified.
- D. An operational test, in which the chiller is run under load, is performed at the factory. This test checks for proper operation of fans as well as various controls and safeties, and a Certificate of Unit Testing, indicating successful end-of-line testing, is provided with the unit.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Unit controls shall be capable of withstanding 150°F (65.5°C) storage temperatures in the control compartment.
- B. Unit shall be stored and handled per unit manufacturer's recommendations.

1.5 PHYSICAL LAYOUT

- A. Unit shall be located such that minimum recommended airflow clearances are maintained.
- B. If minimum recommended clearances cannot be maintained, an ExpertFit™ analysis must be performed. The ExpertFit software model is available in the chiller selection program and predicts air-cooled chiller performance within a confined space.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Carrier Aquaforce Air-Cooled Variable Speed Screw Chiller 30XV or comparable product by one of the following:
1. Carrier
 2. Trane
 3. Daikin

2.2 EQUIPMENT

NOTE: To avoid extended chiller downtime, when changing chiller sensors and/or instrumentation, no control panel reprogramming shall be required.

- A. General: Factory assembled, single-piece chassis, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge, and special features required prior to field start-up.
- B. Materials of Construction:
1. The base rail is industrial-quality, 7 ga, zinc-dipped galvanized frame (with Magni-coated screws).
 2. Cabinet shall be galvanized steel casing with a baked enamel powder or pre-painted finish.
 3. Painted parts shall withstand 1000 hours in constant neutral salt spray under ASTM B117 conditions with a 1 mm scribe per ASTM D1654. After test, painted parts shall show no signs of wrinkling or cracking, no loss of adhesion, no evidence of blistering, and the mean creepage shall not exceed 1/4 in. (Rating ³ 4 per ASTM D1654) on either side of the scribe line.
- C. Fans:
1. Condenser fans shall be variable speed, 9-blade airfoil cross-section, reinforced polymer construction, shrouded-axial type, and shall be statically and dynamically balanced with inherent corrosion resistance.
 2. The variable speed drives condenser fans shall include a DC link reactor.
 3. Air shall be discharged vertically upward.
 4. All VFDs on the chiller (compressor motors and fans) shall be fully air cooled and shall not require an additional glycol cooling system, thus avoiding the maintenance associated with such cooling systems.
 5. Fans shall be protected by coated steel wire safety guards.
 6. Fan blades shall have serrated edges to minimize the sound that is produced.
- D. Compressor/Compressor Assembly:

1. Comprised of semi-hermetic twin screw type compressors.
2. Compressor motor shall be direct drive, VFD (variable frequency drive) controlled to match the load requirement, with a maximum speed of 5880 or 6300 rpm. The motors are protected by motor temperature sensors, and are suction gas cooled.
3. In order to optimally match building load, maximize chiller power factor and help equalize compressor run time, all chiller compressors must be VFD controlled.
4. For improved reliability with fewer moving parts, the compressor shall not employ a slide valve.
5. Capacity control shall utilize a VFD to unload each compressor from 100% to 25% of full load, resulting in a chiller minimum load of less than 15%. A VI (volume index) valve is used to optimize the efficiency at full and part load conditions.
6. The VFD for each compressor motor shall include a DC link reactor.
7. Compressor shall include an internal muffler to reduce pulsations in the system.
8. All VFDs on the chiller (compressor motors and fans) shall be fully air cooled and shall not require an additional glycol cooling system, thus avoiding the maintenance associated with such cooling systems. If supplying VFD glycol cooling system equipment, manufacturer must provide a separate line item in their quotation for the following:
 - a. Every five years glycol solution replacement and clean strainer
 - b. Yearly pH test
 - c. Yearly fluid level check
 - d. Yearly glycol condenser cleaning
 - e. Hail guard provided for glycol condenser section

The following list of critical parts must be provided:

- f. Glycol pump
 - g. Glycol condenser or plate frame heat exchanger
 - h. Extra hoses and clamps
 - i. Backup fan coil fan
 - j. Backup fan coil evaporator
9. Compressor performance shall not rely on an internal Teflon coating because this material deteriorates over time. This deterioration results in loss of capacity, higher operating costs due to lower efficiency and increased maintenance requirements.
- E. Flooded Evaporator:
1. Shall be mechanically cleanable tubes in a shell-and-tube type evaporator with removable heads.
 2. Tubes shall be internally enhanced seamless-copper type rolled into tube sheets.
 3. Shall be equipped with Victaulic-type water connections.
 4. Shell and evaporator heads shall be insulated with 3/4-in. PVC foam (closed-cell) with a maximum K factor of 0.28. Design shall incorporate 2 independent refrigerant circuits.

5. Evaporator shall be tested and stamped in accordance with ASME Code for a refrigerant working side pressure of 220 psig (1517 kPa). Evaporator shall have a maximum water-side pressure of 300 psig (2068 kPa).
 6. Evaporator shall have a evaporator drain and vent.
 7. Low-ambient temperature protection: unit shall have factory-installed evaporator heater (where applicable) to protect evaporator from ambient temperature freeze down to 0°F (–17.8°C).
 8. Evaporator shall be provided with a factory-installed flow switch.
- F. Condenser:
1. Coil shall be air-cooled Novation® heat exchanger technology (MCHX) and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant man-ifolds. Novation coils shall consist of a two-pass arrangement. Coil construction shall consist of alumi-num alloys for fins, tubes, and manifolds in combination with a corrosion-resistant coating.
 2. Tubes shall be cleaned, dehydrated, and sealed.
 3. Assembled condenser coils shall be pressure tested at the coil factory at 660 psig (5448 kPa) and sub-sequently shall be leak tested at 145 psig \pm 5 psig (1000 kPa \pm 34.5 kPa) and pressure tested at 350 psig (2413 kPa) at final unit assembly.
 4. To plan the chiller installation and for ease of maintenance/coil removal, all refrigerant piping entering and leaving the condenser coils shall be located on only one side of the chiller so the coils can be re-moved (when needed) from the side free of piping. This is important to consider because removing the coils from the header side, although possible, involves extra labor due to extra bending and brazing of the coil headers.
- G. Refrigeration Components:
- Refrigerant circuit components shall include replaceable-core filter drier, moisture indicating sight glass, electronic expansion valve, discharge service valves and liquid line service valves, and complete operating charge of both refrigerant and compressor oil.
- H. Controls, Safeties, and Diagnostics:
1. Unit controls shall include the following minimum components:
 - a. Microprocessor with non-volatile memory. Battery backup system shall not be accepted.
 - b. Separate terminal block for power and controls.
 - c. Separate 115-v power supply to serve all controllers, relays, and control components.
 - d. ON/OFF control switch.
 - e. Replaceable solid-state controllers.
 - f. Pressure sensors installed to measure suction, oil, economizer, discharge, and liquid pressure. Thermistors installed to measure evaporator entering and leaving fluid temperatures and outside-air temperature.
 2. Unit controls shall include the following functions:
 - a. Automatic circuit lead/lag.
 - b. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature with temperature set point accuracy to 0.1°F (0.05°C).
 - c. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range of 0.2°F to 2°F (0.1 to 1.1°C) per minute to prevent excessive demand spikes at start-up.
 - d. Seven-day time schedule.

- e. Leaving chilled fluid temperature reset from return fluid and outside air temperature.
 - f. Chilled water pump start/stop control.
 - g. Chiller control for parallel chiller applications without addition of hardware modules and control panels (requires thermistors).
 - h. Timed maintenance scheduling to signal maintenance activities for strainer maintenance and user-defined maintenance activities.
 - i. Low ambient protection to energize evaporator heaters (if installed).
 - j. Single step demand limit control activated by remote contact closure.
 - k. Night time sound mode to reduce the sound of the machine by a user-defined schedule.
3. Diagnostics:
- a. The control panel shall include, as standard, a display:
 - 1) Seven-inch color touch screen display with stylus.
 - 2) Display shall allow a user to navigate through menus, select desired options and modify data.
 - b. Features of the display shall include:
 - 1) Multiple connection ports for USB, Ethernet or BACnet IP, LEN (local equipment network), and Carrier Comfort Network® (CCN) connections. NOTE: BACnet IP may require additional programming.
 - 2) Automatic reporting of alarms over email.
 - 3) Ability to graphically plot trends of system performance and conditions over time.
 - 4) Graphical summary display of current chiller operation and water conditions.
 - 5) Display shall allow access to configuration, maintenance, service, set point, time schedules, alarm history, and status data.
 - 6) Three levels of password protection against unauthorized access to configuration and maintenance information, and display set up parameters.
 - 7) Full compatibility with the Carrier Comfort Network® (CCN) system to provide email alarm notification and to provide network capability to fully monitor and control chiller.
 - 8) Display shall be capable of displaying the last 50 alarms with clear full text description and time and date stamp, and will store a snapshot of operating conditions before and after the 10 most recent alarms.
 - 9) Display run hours and number of starts for machine and individual compressors.
 - 10) Display current draw for each circuit compressor and fans.
 - 11) The control system shall allow software upgrade without the need for new hardware modules.
 - 12) The unit is intended to run on an I-VU control system.
4. Safeties:
- a. Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protections:
 - 1) Reverse rotation.
 - 2) Low chilled fluid temperature.
 - 3) Motor overtemperature.
 - 4) High pressure.
 - 5) Electrical overload.

- 6) Loss of phase.
- 7) Loss of chilled water flow.
- b. Condenser-fan motors shall have internal overcurrent protection.
- I. Operating Characteristics:
 1. Unit, without modification, shall be capable of starting and running at outdoor ambient temperatures from 32°F (0°C) to 125.6°F (52°C) for all units employing variable speed condenser fans and outdoor ambient temperatures from 32°F (0°C) to 105°F (40.6°C) for units that do not employ variable speed condenser fans. Selections up to 125.6°F (52°C) must be provided when requested, and both mid and high tier units shall be operational up to 131°F (55°C).
 2. Unit shall be capable of starting up with 95°F (35°C) entering fluid temperature to the evaporator.
 3. After power restoration, and with the Capacity Recovery™ feature (a standard controls feature) enabled, unit shall be capable of full capacity recovery in less than 5 minutes.
- J. Motors:

Condenser-fan motors shall be totally enclosed, air over, variable speed, 3-phase type with permanently lubricated bearings and Class F insulation. Fans shall be 8-pole for standard tier units and 6-pole for medium and high tier units.
- K. Electrical Requirements:
 1. Unit primary electrical power supply shall enter the unit at a single location (all chiller voltage/size combinations shall have the ability to accommodate 2 power supplies to meet job-specific requirements).
 2. Primary electrical power supply shall be rated to operate up to 125.6°F (52°C) ambient temperature for all models.
 3. Unit shall operate on 3-phase power at the voltage shown in the equipment schedule.
 4. Control points shall be accessed through terminal block.
 5. Unit shall be shipped with factory control and power wiring installed.
 6. Unit shall have a standard SCCR (short circuit current rating) value of 25 kA for all voltages other than 575-v, and 10 kA for 575-v units.
- L. Chilled Water Circuit:
 1. Chilled water circuit shall be rated for 300 psig (2068 kPa). Units with optional hydronic kit are rated for 150 psig(1034kPa) working pressure.
 2. Thermal dispersion proof of flow switch shall be factory installed and wired.
- N. Special Features:

Certain standard features are not applicable when the features designated by * are specified. For assistance in amending the specifications, contact your Carrier representative.

 1. Variable Speed Condenser Fans:

All fans on the unit shall have variable speed fan motors to provide higher part load efficiency and reduced acoustic levels. Each fan circuit shall have a factory-installed, independent variable speed drive with display. Variable speed drives are rated IP-55 enclosures and UL Listed. The use of this option, with the addition of antifreeze in the evaporator circuit and wind baffles, shall allow running with outdoor ambient temperatures down to -20°F (-29°C). Variable speed condenser fans also allow the chiller to operate at ambient temperatures as high as 125.6°F (52°C). This option is only available on standard-tier units because both mid-tier and high-tier units are automatically provided with this functionality. Variable speed condenser fans are always provided on 575 v units, and not available for unit sizes 225-500 at 208/230 v or for unit size 140 standard tier at any voltage.

2. Unit-Mounted Non-Fused Disconnect:

Unit shall be supplied with factory-installed, lockable, non-fused electrical disconnect for main power supply. This factory option is not available with dual point power in sizes 350-500.

3. Optional Condenser Coil Materials:

b. Aluminum fin/copper-tube coils:

Coil shall be constructed of seamless copper tubes mechanically bonded to aluminum fins. Fins shall have wavy enhancements. These coils are not recommended for corrosive environments.

NOTE: Whenever the condenser coil is specified as aluminum fin, copper-tube coils, it shall not be acceptable to have any microchannel coil at any location on the chiller, including the VFD cooling system.

c. Due to chiller clearance and serviceability considerations, all coil headers shall be on the same side of the unit.

4. Condenser Coil Trim Panels:

Unit shall be supplied with factory-installed or field-installed coil covers. Factory-installed coil trim panels are not available when a factory-installed full hail guard is selected.

5. BACnet/Modbus Translator Control:

Unit shall be supplied with factory or field-installed interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485). Field programming shall be required.

6. Isolation Valve Option:

Unit shall be supplied with factory-installed isolation valve which provides a means of isolating the compressors from the evaporator vessel, which is beneficial in servicing the chiller. The isolation option comes in various configurations depending on the installation region (Middle Eastern or elsewhere). On all units which are not installed in the Middle East region, a liquid line service valve and a motorized discharge isolation valve are always provided per refrigerant circuit. For Middle Eastern regions only, a manual discharge valve is standard and a motorized discharge ball valve is optional. The selection of the isolation valve option results in chillers which are equipped with a liquid line service valve, a discharge service valve (motorized or manual type), and a series of valves on or near the evaporator. The net effect is to provide isolation capability in the condenser area, the evaporator area and the compressor area.

NOTE: The only situation in which the isolation of the condenser area allows the full charge to be stored in the condenser is when round tube, plate fin (RTPF) coils are employed.

7. Suction Line Insulation:

Unit shall be supplied with suction line insulation. Insulation shall be tubular closed-cell insulation. This option shall be required with applications with leaving fluid temperatures below 30°F (−1.1°C) and recommended for areas of high dewpoints where condensation may be a concern.

8. Control Transformer:

Unit shall be supplied with a factory-installed transformer that will allow supply control circuit power from the main unit power supply. This is automatically provided on 50 Hz chillers.

9. High SCCR (Short Circuit Current Rating):

The optional high SCCR (short circuit current rating) device shall allow the chiller to tolerate a 65 kA (all voltages except 575-v) or a 35 kA (575-v units) short circuit current for a brief period of time while protecting downstream components. The high SCCR option shall provide a higher level of protection than the standard unit. At 208/230-v, this option is only available with the

combination of dual point power and unit sizes 140-200. For unit sizes 350-500, when dual-point power is selected, two molded case switches will be provided, and non-fused disconnects are not available.

10. Evaporator for Brine Application:

Unit shall be equipped with a factory-installed evaporator for applications employing ethylene glycol or propylene glycol in the chilled-fluid loop and which have leaving-fluid temperatures down to 20°F (−6.7°C).

11. Security Grilles (Sides) and Hail Guard (Ends):

Unit shall be equipped with a factory-installed option consisting of louvered panels on the ends of the machine and security grilles on the sides of the machine. These coverings shall firmly fasten to the machine frame and provide coverage from the top to the bottom of the unit. Both security grilles and hail guards are available individually, but neither of these individual items is the same design as this factory option.

12. Low Sound Kit:

Unit shall be provided with factory-installed sheet metal enclosures with sound-absorbing panels for each compressor as well as an external muffler between each compressor and its associated oil separator.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust and level chiller in alignment on supports.
- C. Coordinate electrical installation with electrical contractor.
- D. Coordinate controls with control contractor.
- E. Install a field-supplied or optional manufacturer-supplied strainer in the chilled water return line at the evaporator inlet that meets manufacturer perforation size specifications.

3.2 START-UP

- A. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.

END OF SECTION 236400

SECTION 237313 AIR HANDLING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 RELATED WORK SPECIFIED ELSEWHERE

Vibration Isolation: Section 230550
Wiring of Mechanical Equipment: Section 230512
Motor Controls: Section 230512

1.03 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each type of unit specified.
- B. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Submit 2 copies to the Engineer, incorporated within maintenance manuals, covering the installed products.

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Fan ratings shall be approved by the AMCA. In lieu of an AMCA approved fan rating for the fan section of the unit, the Engineer may accept the fan manufacturer's certified rating, provided this fan manufacturer has AMCA approved ratings on his regularly manufactured centrifugal fans.
- B. Source Quality Control: Factory test units in accordance with AMCA Standard 210 "Test Code for Air Moving Devices" and ARI Standard 410 "Standard for Forced Circulation Air Cooling and Air Heating Coils".
- C. The design indicated on the schedules and shown on the drawings is based upon the products of the named manufacturer. Alternate equipment manufacturers are acceptable if equipment meets scheduled performance requirements and dimensional requirements.
- D. If equipment is supplied by a manufacturer other than the one named, coordinate with the General Contractor and affected subcontractors to ensure the specified performance is met. This coordination shall include (but is not limited to) the following:
 - 1. Structural supports for units
 - 2. Size and location of concrete bases/housekeeping pads
 - 3. Location of roof curbs, unit supports and roof penetrations
 - 4. Ductwork sizes and connection locations
 - 5. Piping size and connection/header locations
 - 6. Interference with existing or planned ductwork, piping and wiring

- 7. Electrical power requirements and wire/conduit and over current protection sizes.
- 8. Trap height requirements

- E. The Mechanical Contractor shall be responsible for costs incurred by the General Contractor, Subcontractors, and Consulting Engineers to accommodate units furnished by a manufacturer other than manufacturer named as basis of design.

1.05 REFERENCES

- A. AMCA 99 – Standard Handbook
- B. AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes
- C. AMCA 500 – Test Methods for Louvers, Dampers, and Shutters
- D. AMCA 611-95 – Methods of Testing Airflow Measurement Stations for Rating
- E. ANSI/AFBMA 9 – Load Ratings and Fatigue Life for Ball Bearings
- F. ANSI/UL 900 – Test Performance of Air Filter Units
- G. ARI 260 – Sound Rating of Ducted Air Moving and Conditioning Equipment
- H. ARI 410 – Forced-Circulation Air Cooling and Air Heating Coils
- I. ARI 430 – Testing and Rating of Central-Station Air Handling Units
- J. ASHRAE 52.1/52.2 – Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size
- K. ASHRAE 62 – Ventilation for Acceptable Indoor Air Quality
- L. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings
- M. ASTM-C 1338 – Standard Test Method for Determining Fungi Resistance of Insulation Material and Facings.
- N. NFPA 70 – National Electric Code (conductors, equipment and raceways)
- O. NFPA 90A – Installation of Air Conditioning and Ventilation Systems
- P. SMACNA – HVAC Duct Construction Standards
- Q. UL-181 – Mold Growth and Humidity Test
- R. UL-1995 – Standard for Safety for Heating and Cooling Equipment

1.06 DELIVERY, STORAGE AND HANDLING

- A. Follow manufacturer's recommendations for handling, unloading and storage.
- B. Protect, pack, and secure loose-shipped items within the air-handling units. Include detailed packing list of loose-shipped items, including illustrations and instructions for application.
- C. Protect, pack and secure controls devices, motor control devices and other electronic equipment. Do not store electronic equipment in wet or damp areas even when they are sealed and secured.
- D. Seal openings to protect against damage during shipping, handling and storage.
- E. Provide shrink-wrap around unpainted units. The membrane shall cover entire AHU during shipping and storage. Cover equipment, regardless of size or shape. Tarping is not acceptable.
- F. Shrink-wrap equipment, including electrical components, for protection against rain, snow, wind, dirt, sun fading, road salt/chemicals, rust and corrosion. Keep equipment clean and dry.

- G. Tarp painted units to protect against rain and road debris during shipping.
- H. Clearly mark AHU sections with unit tag number, segment sequence number, and direction of airflow. Securely affix safety-warning labels.

1.07 EXTRA MATERIALS

- A. Provide one set of filters for balancing, and one additional set for final turnover to owner.
- B. Provide one extra set of belts, in addition to the factory-installed set.

1.08 WARRANTY

- A. Provide warranty for 18 months from date of shipment. Warranty shall cover manufacturer defects. Warranty shall include labor for 12 months from date of shipment. Warranty work shall be performed by manufacturer's factory-trained and factory-employed technician. Service technician must be based within 50 miles of job site.
- B. Include factory-provided controls in the parts and labor warranties.
- C. Parts associated with routine maintenance, such as belts and air filters shall be excluded.

1.09 SYSTEM STARTUP

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
- B. Comply with manufacturer's start-up requirements to ensure safe and correct operation and integrity of warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Trane Co.
McQuay
Carrier
AAON
Daikin
York
Or Approved Equal

2.02 GENERAL DESCRIPTION

- A. Air Handling Unit (AHU) consists of a structural base, insulated casing, access doors, fans, motors, motor controls, coils, filters, dampers, controls, components, and accessories; as shown on drawings, schedules, and specifications.
- B. Provide AHU to meet the specified levels of performance for scheduled items including airflow, static pressure, cooling capacity, heating capacity, electrical characteristics, sound, casing leakage, panel deflection and casing thermal performance.

- C. AHU shall maintain structural integrity when wall panels are removed.
- D. Provide internal components and accessories as specified and scheduled. Components and accessories shall be installed by the AHU manufacturer in an ISO- 9002 certified facility.
- E. Ship units in one piece. Split units only where necessary for shipping and installation.
- F. Manufacturer shall provide detailed, step-by-step instructions for disassembly and reassembly.
- G. For AHU segments that must be broken down for rigging and installation: segment shall be disassembled and reassembled by manufacturer's factory-trained service personnel.
- H. Manufacturer shall perform a field leakage test to confirm 1% leakage per section 2.25.
- I. Manufacturer shall provide a written statement confirming that the unit is built to the manufacturer's factory standards and that the unit will carry the full warranty.

2.03 MATERIALS

- A. Sheet Metal:
 - 1. Galvanized Sheet Steel: Zinc coated carbon steel, commercial quality-ASTM A527-67, mill phosphatized. Galvanizing: ASTM A525-67, commercial coating class 1.25 oz. per sq. ft.
 - 2. Cold Rolled Steel: Carbon steel, commercial quality-ASTM A366-66T. Sheet steel shall be de-greased, cleaned and phosphatized in the factory of the manufacturer, or mill phosphatized.

2.04 AIR HANDLING UNITS

- A. General Design: Provide units of sectional construction each consisting of a fan section, coil section, multizone damper section, filter section, filter/mixing box section and accessories, as indicated.
- B. Casing: Fabricate exterior wall panels from a minimum of No. 18 USS gage sheet steel with interior wall panels of minimum 20 gage sheet steel, properly reinforced and braced for maximum rigidity, with supporting steel framework as required. Closed cell foam gasketing shall be used where modules join. Furnish easily removable panels and inspection doors for access to all internal parts. Fabricate inspection doors from minimum No. 18 USS gage sheet steel, with the edges of all doors and removable panels formed for rigidity. Thermally insulate the casing with a factory installed, minimum 1" thick fibrous glass liner between the exterior and interior wall panel. With the exception of perforated wall panels there shall be no insulation exposed to the airstream.
 - 1. Provide double wall AHU casing. Gage: Double Wall Exterior: Minimum No. 18 USS sheet steel. Finish: Powdered Aluminum. Contractor to coordinate with Architect and Owner regarding finish type and color for the AHU casing. Exposed insulation is not acceptable.

2. Panel assembly shall meet UL standard 1995 for fire safety. Panel assembly shall comply with the requirements of NFPA 90A.
 3. Provide an insulation system that is resistant to mold growth in accordance with a standardized test method such as UL 181 or ASTM C 1338.
 4. Encapsulate insulation with sheet metal so that air does not contact insulation. Panels insulated with fiberglass shall be sealed at each corner and around their entire perimeter, to eliminate airflow through the panel and to eliminate microbial growth potential within the casing wall.
 5. Unit Insulation should be a minimum as follows. Double Wall: Minimum 2 inch thick insulation material. Insulation minimum 1-1/2 pound density.
 6. Provide casing with minimum thermal resistance (R-value) of 12 hr-ft²-°F/ BTU.
 7. Roof, wall, floor, and access door panels shall be galvanized or stainless steel, min. No. 18 USS stainless steel.
 8. Provide perforated liner in the fan section and other sections as shown on the drawings. The perforated panel shall enclose matte-faced fiberglass insulation.
 9. Provide a unit frame of galvanized steel that provides the overall structure of the unit and does not rely on the casing panels for structural integrity. Insulate frame in the same manner as panels, roof, and floors.
 10. Provide AHU casing that leaks no more than 1% of design airflow at +/-8" w.g.
 11. Provide wall panels and access doors that deflect no more than L/240 when subjected to +/- 8" w.g. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint.
 12. Provide floors and roofs that deflects no more than L/240 when subjected to a 300 lb load at mid-span. 'L' is the panel-span length and 'L/240' is the deflection at panel midpoint. M. Provide outdoor AHUs with a roof system that deflects no more than L/240 when subjected to a snow load of 30 lb/ft². 'L' is defined as the panel-span length and 'L/240' is the deflection at the panel midpoint.
 13. Provide outdoor AHUs with a roof sloped at a minimum pitch of 1/4" per foot. The roof shall overhang side and end panels by a minimum of 2".
- C. Fan Section: Furnish fans of the double width, double inlet, forward curved, multi-blade centrifugal type, designed for low operating speeds. Fabricate fan housing utilizing lock seam construction to ensure rigidity and render it mechanically airtight. Provide streamlined fan inlets, with all fan outlet areas proportioned to wheel size, according to AMCA standards. Provide shaft bearings of the grease packed ball or sleeve type, sealed in self-aligning pillow blocks. Bearings shall be equipped with grease lines allowing for lubrication from one side of the fan. Factory coat fan shaft with a corrosion preventative compound. Mount unit motor internally, complete with adjustable base, adjustable V-belt drive and an approved belt guard. Fan and motor shall be internally isolated from

unit casing with spring isolators, furnished and installed by the unit manufacturer. Statically and dynamically balance and test fan assembly at factory.

1. Provide double width double inlet (DWDI) housed fans, multi-blade centrifugal type or single width single inlet (SWSI) plenum fans as equipment schedule and drawings.
 2. Airfoil fans shall comply with AMCA standard 99 2408 69 and 99 2401 82. Provide an AMCA Seal on airfoil fans. Airfoil fan performance shall be based on tests made in accordance with AMCA standards 210 and comply with the requirements of the AMCA certified ratings program for air performance.
 3. Provide fans with true airfoil blades unless otherwise scheduled.
 4. Provide fans with the following accessories:
 - a. Fan inlet screens in the inlets of fan housing (REQUIRED on SWSI plenum fans)
 - b. Access door inlet screen (on AHU casing)
 - c. OSHA-compliant belt guard enclosing the fan motor and drive.
 5. Provide airfoil fans with blades formed of extruded aluminum, as scheduled. Bent sheet metal blades are not acceptable.
 6. Provide an access door in the fan scroll, as shown on drawings.
 7. Provide fans with polished steel shafts with first critical shaft speed at least 125% of the maximum operating speed for the fan pressure class. Shaft shall have an anti-corrosion coating.
 8. Provide fan motor on an adjustable base to allow adjustable and consistent belt tension.
 9. Mount the fan and motor assembly on a common adjustable base. This common base shall attach to vibration isolators, which mount to structural support channels. These channels shall span the AHU floor and mount directly to the AHU frame. Manufacturers not complying with this requirement must submit detailed structural and weight data to a licensed structural engineer for review and stamped certification. The mechanical engineer shall review these engineers' final reports prior to submittal approval.
 10. The fan and motor assembly shall be internally isolated from the unit casing. Provide vibration isolation springs with 1" or 2" static deflection. Internally Mounted: Spring isolators by manufacturer. The isolation system shall be designed to resist loads produced by external forces, such as earthquakes, and conform to the current IBC seismic requirements.
 11. Connect DWDI fans to the unit casing or bulkheads with canvas flexible connection.
 12. Provide horizontal thrust restraints between AHU casing and fan housings with end discharge. This requirement applies to the following cases:
 - a. SWSI fans operating at greater than 3" of total static pressure
 - b. DWDI airfoil fans operating at greater than 6" of total static pressure
 - c. DWDI airfoil fans operating at greater than 3" of total static pressure
- D. Coil Section: Support heating coils from unit casing, as required and approved. Design coils with built-in-pitch between headers, or pitch coils inside casings to permit drainage, with connections located where indicated. Provide coils with adequate gasketing or safig to prevent air by-pass between coil channels, finned surfaces and casing. Fabricate coils of seamless copper, with aluminum flat plate fins with formed collars permanently bonded to the tubes by mechanical expansion of the tubes, or equivalent method as approved. Design encased coil banks, so as to permit the removal of any individual coil, without disturbing other coils in the bank. Coil extensions shall pass through ends of

casing and shall be air and water tight. Design coils for use with steam or water for a minimum working pressure of 200 psig WSP, 200 psig OWG and factory test at 200 psig air under water.

E. Additional Coil Requirements:

1. Coils shall meet or exceed performance scheduled on drawings. When applicable, Provide coils with performance certified in accordance with AHRI Standard 410 for coil capacity and pressure drop. Circuit coils such that the fluid velocity is within the range of certified rating conditions at design flow.
2. Provide cooling coils with a maximum face velocity of 550 fpm or 500 fpm or 450 fpm. Face velocity calculations shall be based on the finned area of the coil.
3. Provide cooling coil drain pan that is sufficient to contain coil condensate.
4. Provide coil segment casing to accommodate full-face or reduced-face coils as scheduled. Provide face and bypass coil segments with factory installed bypass damper.
5. Provide at least 18" or 24" or 30" of access between coils. Provide an easily operable access panel or door, as shown on drawings.
6. Provide coil segment casing that meets or exceeds casing performance of the unit.
7. Provide panels that are easily removable with no special tools.
8. Locate access doors to provide clearance for pipe insulation, connectors, and accessories. Space shall allow a minimum of 90 degrees of door swing.
9. Provide coils built in their own full perimeter frame. Tube sheets on each end shall have fully drawn collars to support and protect tubes. Horizontal coil casing and support members shall allow moisture to drain. Casing and support members shall not block finned area.
10. Provide a single intermediate vertical coil support on coils with a finned length greater than 62". Provide two vertical supports on coils with a finned length greater than 100", and three vertical supports on coils with a finned length greater than 141".
11. Extend coil connections through AHU casing. Provide a 1/4" FPT plugged vent/drain tap on each connection. Circuiting shall allow complete draining and venting when installed. Vent and drain connections shall be on the coil connection extension outside of the unit casing.
12. Insulate gap between coil stub out connection and AHU casing with a spool-shaped sleeve grommet. Adhesive rings applied the casing walls are not acceptable.
13. Water and glycol coils shall be operable at 250 psig working pressure and up to 300° F. Factory test water and glycol coils with 200 psig compressed air under water.
14. Provide coils with a tube OD of 5/8" or 1/2". Mechanically expand tubes to form full bond and provide burnished, work-hardened interior surface. Tubes shall have a minimum tube wall thickness of 0.020" or 0.025" or 0.035" or 0.049" for 5/8" tubes, and 0.016" or 0.020" or 0.032" for 1/2" tubes.
15. Provide coils with copper tube return bends with the following final minimum thicknesses: 1. 0.035" for 5/8" diameter tubes 2. 0.032" for 1/2" diameter tubes with 0.020" or 0.032" tube wall thicknesses 3. 0.020" for 1/2" diameter tubes with 0.016" tube wall thickness.
16. Provide water, glycol coil headers made of seamless copper or brass tubing. Pipe connections shall be steel or red brass. Header connections (tubes and piping connections) shall be silver-brazed or TIG welded.

17. Provide coils with die-formed, continuous aluminum or copper fins. Fins shall have fully drawn collars to accurately space fins and protect tubes. Fins shall be 0.006" or 0.008 or 0.01" thick.

F. Drain Pans

1. Provide drain pans that comply with requirements for the AHU casing.
2. Comply with the stated intent of ASHRAE Standard 62.
3. Provide a drain pan under each cooling coil. Drain pans for cooling coils shall meet the requirements of ASHRAE 62.
4. Provide drain connection made of same material as drain pan. Do not use dissimilar metals because of the risk of galvanic corrosion. Weld connection to the drain pan.
5. Drain pan shall be insulated double wall galvanized steel construction with an R-value of 12 hr-ft²-°F/BTU. The entire area of the drain pan shall have this level of thermal performance.
6. Insulate plumbing associated with drain pan drains and connections.
7. Provide drain pan under the complete width and length of cooling coil section.
8. Drain pan shall allow visual inspection and provide inspection door for physical cleaning on 100% of the pan surface with or without removal of the coil.
9. Provide a minimum of 1" clearance between the drain pan and any coil casing, coil support or any other obstruction.
10. Provide drain pan that allows the design rate of condensate drainage regardless of fan status.
11. Provide drain pan sloped by at least 1/8" per foot toward a single drain. Locate drain connection at the lowest point of the pan. Pan shall have no horizontal surfaces.

G. Filter / Mixing Box Section: Furnish combined air filtering and mixing functions in one standard section. Filter section shall include angled 2" pleated throwaway filters rated for 30% efficiency on ASHRAE Standard 52-76. Filters shall be accessible from both sides through hinged access doors. Mixing box shall include integral, parallel blade interconnected, outdoor and return low leakage air dampers. Dampers shall be insulated with thermally broken frame and shall have stainless steel or compressible edge seals and vinyl blade edge seals for a maximum leakage rating of 4.1 cfm per sq.ft. of face area at 4" water gauge differential static pressure. Blades shall rotate on nylon bearings; Tamco Series 9000 BF or acceptable equal.

1. Provide filter segment and filters for each AHU, see Section 234100 - AIR FILTERS.

H. Damper Section: Damper section is to be designed as a single assembly with airfoil type blades. Dampers shall have compressible jamb seals and extruded vinyl blade seals with leakage ratings of less than nine cfm/sq. ft. at one-inch w.g. Dampers shall rotate on stainless steel bearings.

1. Provide dampers tested in accordance with AMCA 500.
2. Provide factory-installed dampers, as per manufacturer. Dampers shall modulate the volume of the outdoor, return, or exhaust air.

3. Dampers shall have double skin airfoil blades, extruded vinyl edge seals on all blades, and flexible metal compressible jamb seals. Blades shall rotate on stainless steel sleeve bearings.
4. Dampers shall have a maximum leakage rate of 3 CFM/square foot at 1" w.g., and shall comply with ASHRAE 90.1.
5. Damper blades shall be parallel or opposed blade configuration, as per manufacturer.
6. Damper blades shall be galvanized steel or aluminum.

I. Electrical Motors

1. Provide fan motors built in accordance with the latest standards of the NEMA and IEEE.
2. Provide AHU and fan motors in compliance with the latest NYS Energy Conservation Code or ASHRAE 90.1.
3. Provide fan motors with the following characteristics:
 - a. 60 hertz, 1750 rpm operation
 - b. Service factor of 1.15
 - c. Premium efficiency, or as required to meet ASHRAE 90.1
 - d. NEMA design ball bearing type
 - e. Rated for continuous duty at full load in a 104°F (40°C) ambient
 - f. Open drip proof (ODP) or totally enclosed, fan cooled (TEFC) as scheduled

2.05 Total Enthalpy Energy Recovery Wheel

- A. Wheel Matrix: Rotors shall be constructed of rotating honeycomb aluminum matrix. Energy wheel shall have a highly selective desiccant permanently bonded to aluminum matrix and heat wheel shall have an epoxy coating applied to the aluminum matrix. The performance of all wheel prototypes shall be tested in accordance with ASHRAE Standard 84-91 and AHRI Standards 1060-18. The energy wheel shall transfer moisture as well as sensible energy between the two airstreams. The heat wheel shall only transfer sensible energy. The desiccant material shall be a silica gel or molecular sieve with pore diameter of 3A to minimize the carryover of undesirable gases. Corrugated media shall provide individual flutes to channel the airflow and thus minimize cross contamination and ensure rated performance under all differential pressure conditions. The energy wheel desiccant coating shall provide corrosion resistance against attack from laboratory chemicals, etc. and protection in coastal and marine environments. The heat wheel epoxy coating shall minimize corrosion and latent heat transfer. Wheel rotor media that is 72" diameter or smaller can be either segmented or single piece construction. Wheel rotor media larger than 72" diameter shall be segmented. If segmented, each segment shall consist of media supported by spokes and tensioned in place by the rim. Wheels shall have a flatness of $\pm 1/32"$. No adhesives or silicone shall be necessary to secure the media in place in order to allow for future replacement in the event of damage to a segment. The structural frame, casing and rotor shall be designed and manufactured so as to allow a maximum rotor deflection of $1/32"$, as measured at the outer radius, during maximum rated airflow conditions. The media shall have a maximum flame spread of 25 and a maximum smoke developed of 50 when rated in accordance with ASTM E84-09.

- B. Wheel Casing: The wheel frames shall consist of evenly spaced extruded aluminum or corrosion resistant polyurethane coated galvanized steel or epoxy painted heavy duty structural steel spokes, extruded aluminum or corrosion resistant polyurethane coated galvanized steel or epoxy painted heavy duty structural steel outer band, and a rigid center hub. The wheel construction shall allow for wheel alignment. The wheel seals shall be easily adjustable. Seals shall be included to separate the airflows from each other across entire surface of air entering side, air leaving side and outer band (all four planes). Additionally, the entire circumference of the rotor shall include seal to minimize air bypass. The case construction shall be aluminum or corrosion resistant polyurethane coated galvanized steel or epoxy painted heavy duty structural steel. Bearings shall be outboard-flanged ball bearing with concentric locking collars or tapered roller bearings with double setscrew locking collars. Bearings shall be provided with easily accessible grease fittings for maintenance. Bearings shall provide a minimum L-10 life of 100,000 hours of operation. Sealed bearings are also acceptable.
- C. Drive systems shall consist of belt driven heavy-duty inverter Ready or Inverter Duty AC motors. The drive systems shall have a minimum life expectancy of 50,000 hours. The speed control systems shall be variable frequency drive (VFD) capable of operating the rotors from nominally 1/4 RPM to 20 RPM or to the required speed for the type of media used. The OEM controllers for the drive systems shall be integrated with the temperature control system to provide the required energy wheel dry and wet bulb temperatures and heat wheel dry bulb temperatures. The OEM temperature controllers shall monitor entering and leaving temperatures for both airflows. Adjustable set points shall be provided for wheel frost control.
- D. Wheel Accessories
1. OEM controls and factory set (but field adjustable) energy wheel purge system shall be provided to remove exhaust air from the depth of the wheel as it revolves from exhaust side to outside air side. The energy wheel purge system shall be provided to eliminate transfer of exhaust air into the supply air.
 2. Provide rotation detectors, wheel RPM readouts and wheel stoppage alarm contacts.
 3. Provide variable speed drives.
- E. Maintenance
1. The entire rotor and wheel assemblies shall require only limited maintenance and shall be manufactured not to require more than biannual greasing of the main bearings and inspection of the drive systems.
- G. Manufacturers
1. Subject to compliance with requirements, provide enthalpy energy wheel heat exchangers from one of the following manufacturers (or equal). "Equal" indicates that all capacities, dimensions, weights, materials, and performance criteria are equal or better than that described herein.

Thermotech Enterprises TC-Series Thermowheel
Des Champs Thermo-Wheel
AIRotor
Innergy Tech I3
Or equal provided by Air Handling Unit Manufacturer

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install units of type as indicated, in complete accordance with the manufacturer's instructions and as indicated.
- A. Install the Work of this Section in accordance with the manufacturer's printed instructions.
- B. Do not use AHUs for temporary heating, cooling or ventilation prior to complete inspection and startup performed per this specification.
- C. Install AHUs on existing roof curb and adapter curb as per manufacturer's instructions.
- D. Install AHUs with manufacturer's recommended clearances for access, coil pull, and fan removal. Clearances shall be maintained around all components so as to permit inspection, servicing, repair, replacement and visibility of all gauges. When units are installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair. Passageways around all sides of the units shall have an unobstructed width as required by the manufacturer.
- E. Provide one complete set of filters for testing, balancing, and commissioning. Provide second complete set of filters at time of transfer to owner.
- F. Install AHU plumb and level. Connect piping and ductwork according to manufacturer's instructions. Provide all piping and electrical connections to units through knock-out openings in bottom of units.
- G. Unless otherwise shown or specified, install the Work of this Section in accordance with the manufacturer's printed installation instructions.

3.02 FIELD QUALITY CONTROL

- A. Rig and lift units according to manufacturer's instructions. Contractor is responsible to pay all permits and costs related to rigging. Contractor is to follow all safety protocols.

3.03 AHU INSPECTION

- A. The following items shall be inspected prior to startup of unit. Manufacturer representative may be present to ensure installation of AHU is installed properly.
 - 1. Damage of any kind
 - 2. Level installation of unit
 - 3. Proper reassembly and sealing of unit segments as shipping splits.
 - 4. Tight seal around perimeter of unit at the roof curb/adapter curb.
 - 5. Installation of shipped-loose parts, including filters, air hoods, bird screens and mist eliminators, if applicable.
 - 6. Completion and tightness of electrical, ductwork and piping connections.
 - 7. Tight seals around wiring, conduit and piping penetrations through AHU casing.
 - 8. Supply of electricity from the building's permanent source.
 - 9. Integrity of condensate trap for positive or negative pressure operation.
 - 10. Condensate traps charged with water.

11. Removal of shipping bolts and shipping restraints.
 12. Tightness and full motion range of damper linkages.
 13. Complete installation of BMS/control system including end devices and wiring.
 14. Cleanliness of AHU interior and connecting ductwork
 15. Proper service and access clearances
 16. Proper installation of filters
 17. Filter gauge set to zero
- B. The following inspection shall be completed to confirm the AHU fan assembly is installed properly.
1. Fan isolation base and thrust restraint alignment
 2. Tight set screws on pulleys, bearings and fan
 3. Tight fan bearing bolts
 4. Tight fan and motor sheaves
 5. Tight motor base and mounting bolts
 6. Blower wheel tight and aligned to fan shaft
 7. Sheave alignment and belt tension
 8. Fan discharge alignment with discharge opening
 9. Fan bearing lubrication
 10. Free rotation of moving components (rotate manually)

3.04 STARTUP SERVICE AND OWNER TRAINING

- A. Manufacturer's factory-trained and factory-employed service technician shall startup AHUs. Contractor shall 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. Technician shall perform the following steps as a minimum:
1. Energize the unit disconnect switch
 2. Verify correct voltage, phases and cycles
 3. Energize fan motor briefly ("bump") and verify correct direction of rotation.
 4. Re-check damper operation; verify that unit cannot and will not operate with all dampers in the closed position.
 5. Energize fan motors and verify that motor FLA is within manufacturer's tolerance of nameplate FLA for each phase.
- B. Provide a minimum of 4 hours of training for owner's personnel by manufacturer's factory-trained and factory-employed service technician. Training shall include AHU controls, motor starter, VFD, and AHU.
- C. Training shall include startup and shutdown procedures as well as regular operation and maintenance requirements.
- D. Submit a startup report summarizing any problems found and remedies performed. 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.

3.05 FIELD PERFORMANCE VERIFICATION

- A. Leakage: Pressurize casing to +/-8" w.g. and measure leakage. Pressurize casing to – 8"w.g. and measure leakage. If leakage exceeds 1% of design airflow, seal leakage points with a permanent solution. Repeat test. If the AHU still does not pass, contact the manufacturer to seal unit.
- B. Submit a field test report with testing data recorded. Include description of corrective actions taken

3.06 CLEANING

- A. Clean unit interior prior to operating. Remove tools, debris, dust and dirt.
- B. Clean exterior prior to transfer to owner

3.07 DOCUMENTATION

- A. Provide Installation, Operation & Maintenance Manuals in the supply fan section of each unit. Provide six additional copies for owner's project system manual.
- B. Provide six copies of Spare Parts Manual for owner's project system manual

3.08 COMMISSIONING OF PACKAGED HEATING AND COOLING UNITS

- A. HVAC Contractor shall comply with the Commissioning Requirements for packaged heating and cooling units.
- B. All testing for refrigerant piping shall be completed prior to commencement of the commissioning process.

APPENDIX**ADDITIONAL AHU SPECIFICATIONS****Dampers**

The dampers shall be extruded aluminum airfoil construction with blade edge and jam seals and the bypass damper (if used) will include steel construction with interlocking frame design and blade seals.

Base Cabinet

The zoning section is constructed of 16 gauge galvanized steel and 1.5" square tubing and is painted with standard Trane slate gray paint.

Actuators

Actuators controlling the dampers will be Belimo DDC actuators with a floating point input.

Lifting Lugs

Lifting lugs will be provided on the zoning base. The lifting lugs are designed and built to lift the whole unit as one piece.

Power Wiring

Power will need to be run to the disconnect switch located in the unit's power panel. This unit is single point power.

Hot Water Zone Heat NOT USED**ADAPTOR CURB SPECIFICATIONS**

Pre-fabricated rooftop adapters to be manufactured of prime galvanized steel construction, 18 or 14 gauge or as required, meeting ASTM A653/653M with welded corners and with seams joined by continuous water and air tight welds. Adapters shall be insulated and internally reinforced with internally supports, and include necessary block off panel to allow use of existing ductwork.

Installer to field verify all existing roof units to insure proper fit between existing roof top equipment base to new rooftop unit, unless the awarded adapter curb manufacturer representative performs the field survey.

- Heavy gauge Prime G-90 galvanized steel 18 to 14 gauge meeting ASTM A653/653M
- Fully welded and mitered corners
- 1 1/2" thick 3-pound density rigid insulation
- Integral counter flashing for weather tightness
- Adapters are internally supported with cross channel supports on center
- Wood nailer optional if additional roofing is required

END OF SECTION 237313

SECTION 237314**VARIABLE FREQUENCY DRIVES****I.GENERAL**

- A. This specification covers all variable frequency drives (VFDs) designated on the drawing schedules. All standard and optional features detailed herein shall be included within the VFD panel.

The VFD shall be factory installed by the HVAC original equipment manufacturer. The VFD shall have been evaluated by UL and found acceptable for mounting in a plenum or other air handling compartment. Manufacturer shall supply a copy of the UL plenum evaluation upon request.

- B. The VFD shall be tested to UL 508C and bear the appropriate UL label. VFDs designated for use in Canada shall have C-UL certifications.
- C. The VFD shall be CE marked and conform to the European Union Electro Magnetic Compatibility directive.
- D. The VFD shall be UL listed for a short circuit current rating of 100 kA and labeled with this rating either in the instruction manual or with a drive marking, in accordance with UL.
- E. The VFD manufacturer shall supply the VFD and all necessary controls as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years.
- F. VFD shall be manufactured in ISO 9001, 2000 certified facilities.

II.PRODUCTS

- A. The VFD shall convert incoming fixed frequency three-phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor de-rating. Additionally, the VFD shall have the capability to control non-salient permanent magnet (PMAC) motors up to 22kW (30 HP).

When properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

- B. The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load.
- C. The VFD shall be capable of full output current at frequencies in the range of 0 to 120 Hz without de-rating.
- D. The VFD shall have a dual 5% impedance DC link reactor on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The DC link reactors shall be non-saturating. DC link reactors using swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable.
- E. The VFD shall be able to provide full rated output current continuously and up to 110% of rated output current for 60 seconds.
- F. The VFD shall provide full motor torque at any selected frequency from 20 Hz to base speed while providing a variable torque V/Hz output at reduced speed. This is to allow driving direct drive fans without high speed de-rating or low speed excessive magnetization, as would occur if a constant torque V/Hz curve was used at reduced speeds. Breakaway current of 130% shall be available for 0.5 seconds.
- G. A programmable automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings.
- H. The VFD must be able to operate a direct drive fan through its full operating range.
- I. VFD shall be capable of controlling multiple induction motors simultaneously. Multiple motor operation will require additional protective devices per motor.
- J. Input and output power circuit switching shall be accomplished without interlocks or damage to the VFD. Switching rate may be up to 1 time per minute on the input and unlimited on the output.
- K. An automatic motor adaptation algorithm shall be provided in the VFD to measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test.
- L. VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable.
- M. All VFDs rated at 480V and below shall contain integral EMI filters to attenuate radio frequency interference conducted to the AC power line.
- N. Galvanic and/or optical isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents.

III.PROTECTIVE FEATURES

- A. A minimum of Class 20 I2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed.

- B. The VFD shall provide protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and motor over temperature. The VFD shall display all faults in plain language. Codes are not acceptable.
- C. The VFD shall be protected from input phase loss. The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost.
- D. The VFD shall be protected from under voltage. The VFD shall provide full rated output power with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output power, without faulting, with an input voltage as low as 85% of the nominal voltage as required by EN/IEC 61800-3.
- E. The VFD shall be protected from over voltage. The VFD shall continue to operate without faulting with a momentary input voltage higher than 110% of the nominal voltage.
- F. VFD design shall comply with IEC Part 34-17 to prevent breakdown of the motor winding insulation.
- G. The VFD shall incorporate a programmable motor preheat feature which provides the motor stator with a controlled level of current to keep the motor warm and prevent condensation build up in idle motors operating in damp environments. .
- H. VFD shall include a “signal loss detection” algorithm with adjustable time delay to sense the loss of an analog input signal. It shall also include a programmable time delay to eliminate nuisance signal loss indications. The functions after detection shall be programmable.
- I. VFD shall function normally when the keypad is removed while the VFD is running. No warnings or alarms shall be issued as a result of removing the keypad.
- J. VFD shall be capable of catching a rotating motor operating forward or reverse up to full speed without VFD fault or component damage.
- K. Selectable over-voltage control shall be provided to protect the VFD from power regenerated by the motor while maintaining control of the driven load.
- L. VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost.
- M. If the temperature of the VFD’s heat sink rises to approximately 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD’s temperature becomes too high. The VFD shall automatically increase the carrier frequency and current limit to normal values as the heat sink temperature decreases.
- N. The VFD shall store in memory the last 10 alarms. A description of the alarm and the relative sequences of the alarms shall be recorded.

IV.INTERFACE FEATURES

- A. Hand, Off and Auto keys shall be provided to start and stop the VFD and determine the source of the speed reference. It shall be possible to either disable these keys or password protect them from undesired operation.
- B. The VFD shall be programmable to provide a digital output signal to indicate whether the VFD is in Hand or Auto mode. This is to alert the Building Automation System whether the VFD is being controlled locally or by the Building Automation System.
- C. The VFD shall be provided with a keypad with alphanumeric, backlit display. The display shall be capable of remote mounting up to 10 ft. from the VFD. Main Menu password protection shall be provided to guard against unauthorized parameter changes.
- D. All VFDs shall have the same customer interface. The keypad and display shall be identical and interchangeable for all sizes of VFDs.
- E. To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFD’s keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters. Keypad shall provide visual indication of copy status.
- F. Display shall be programmable to communicate in multiple languages including English, Spanish and French.
- G. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
- H. A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD.
- I. A two-feedback PI controller to control the speed of the VFD shall be standard.
 - a) This controller shall accept up to two feedback signals. It shall be programmable to follow the sum of the feedback signals, a preset reference (common set point or up to 8 individual setpoints), or the sum of both. It shall also be possible to calculate the controlling feedback signal as the average, maximum, minimum or the difference between two feedback signals. The VFD shall be able to apply scaling to the feedback signal.
 - b) For fan flow tracking applications, the VFD shall be able to calculate the square root of any or all individual feedback signals so that a pressure sensor can be used to measure air flow.
 - c) The VFD’s PI controller shall be able to actively adjust its set point based on flow. This allows the VFD to compensate for a pressure feedback sensor which is located near the output of the pump rather than out in the controlled system.
- J. Customized meter displays shall be available. They shall include at a minimum, speed/flow, pressure, and power units relative to motor speed.
- K. Programmable Sleep Mode shall be able to stop the VFD. When its output frequency drops below set “sleep” level for a specified time, the VFD may be programmed to stop. When the VFD’s speed is being controlled by its PI controller, it shall be possible to

program a “wake-up” feedback value that will cause the VFD to start. To avoid excessive starting and stopping of the driven equipment, it shall be possible to program a minimum run time before sleep mode can be initiated and a minimum sleep time for the VFD.

- L. A run permissive circuit shall be provided to accept a “system ready” signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of initiating an output “run request” signal to indicate to the external equipment that the VFD has received a request to run.
- M. VFD shall be programmable to sense the loss of load. The VFD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. To ensure against nuisance indications, this feature must be based on estimated motor torque, not current, and must include a proof timer to keep brief periods of no load from falsely triggering this indication.
- N. Standard Control and Monitoring Inputs and Outputs
 - i. Four dedicated, programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
 - ii. Two terminals shall be programmable to act as either as digital or analog outputs.
 - iii. Two programmable relay outputs, Form C 250 VAC, 3 A, shall be provided for remote indication of VFD status.
 - a) Each relay shall have an adjustable on delay / off delay time.
 - iv. Two programmable analog inputs shall be provided that can be either direct- or reverse-acting.
 - b) Each shall be independently selectable to be used with either an analog voltage or current signal.
 - c) The maximum and minimum range of each shall be able to be independently scalable from 0 to 10 V dc and 0 to 20 mA.
 - d) A programmable low-pass filter for either or both of the analog inputs must be included to compensate for noise.
 - v. Two programmable analog current outputs (0/4 to 20 mA) shall be provided for indication of VFD status. This output shall be programmable to show the reference or feedback signal supplied to the VFD and for VFD output frequency, current and power. It shall be possible to scale the minimum and maximum values of the outputs.
 - vi. It shall be possible through serial bus communications to read the status of all analog and digital inputs of the VFD.
 - vii. It shall be possible to command all digital and analog output through the serial communication bus.
- O. Standard programmable firefighter’s override mode allows a digital input to control the VFD and override all other local or remote commands. It shall be possible to program the VFD so that it will ignore most normal VFD safety circuits including motor overload. The VFD shall display FIREMODE whenever in firefighter’s override mode. Fire mode shall allow selection of forward or reverse operation and the selection of a speed source or preset speed, as required to accommodate local fire codes, standards and conditions.
- P. The VFD shall be able to store load profile data such as counters for operating hours, running hours, and kilowatt-hours, to assist in analyzing the system demand and energy consumption over time.
- Q. The VFD shall include a sequential logic controller to provide advanced control interface capabilities. This shall include:
 - i. Comparators of VFD analog values to programmed trigger values
 - ii. Logic operators to combine up to three logic expressions using Boolean algebra
 - iii. Delay timers
 - iv. A 20-step programmable structure

V.SERIAL COMMUNICATIONS

- A. The VFD shall include a standard EIA-485 communications port and capabilities to be connected to the following serial communication protocols at no additional cost and without a need to install any additional hardware or software in the VFD:
 - i. BACnet MS/TP
 - ii. Johnson Controls Metasys N2
 - iii. Modbus RTU
 - iv. Siemens FLN P1
 - v. FC protocol

VI.ADJUSTMENTS

- A. The VFD shall have a manually adjustable carrier frequency that can be adjusted in 1 kHz increments up to 6 kHz, 2 kHz increments up to 12 kHz, and 4 kHz up to 16 kHz to allow the user to select the desired operating characteristics. The VFD shall also be programmable to automatically reduce its carrier frequency to avoid tripping due to thermal loading.
- B. Two independent setups shall be provided.
- C. Eight preset references per setup shall be provided for a total of 16.
- D. Each setup shall have two programmable ramp up and ramp down times. Acceleration and deceleration ramp times shall be adjustable over the range from 1 to 3,600 seconds. The shape of these ramps shall be automatically contoured to ensure no-trip acceleration and deceleration.
- E. Each setup shall be programmable for a unique current limit value. If the output current from the VFD reaches this value, any further attempt to increase the current produced by the VFD will cause the VFD to reduce its output frequency to reduce the load on the VFD. If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: external interlock, under-voltage, over-voltage, current limit, over temperature, and VFD overload.
- F. The number of restart attempts shall be selectable from 0 through 20 or infinity and the time between attempts shall be adjustable from 0 through 600 seconds.

- G. An automatic “start delay” may be selected from 0 to 10 seconds. During this delay time, the VFD shall be programmable to either apply no voltage to the motor or apply a DC braking current if desired.
- H. Three programmable critical frequency lockout ranges to prevent the VFD from operating the load at a speed that causes vibration in the driven equipment shall be provided. Semi-automatic setting of lockout ranges shall simplify the set-up.
- I. When incorporated in the air handler’s design with an optional electro-mechanical bypass, provide a manual 2-contactor bypass consisting of a door interlocked main disconnect pad lockable in the off position, a built-in motor starter and a three position DRIVE/OFF/BYPASS switch controlling two contactors. In the DRIVE position, the motor is operated at an adjustable speed from the VFD. The VFD can be remotely controlled in this position with a pilot relay and analog signal or can be controlled manually using the hand function on the VFD LCD. In the OFF position, the motor and VFD are disconnected. In the BYPASS position, the motor is operated at full speed from the AC power line. In case of an external safety fault, a customer supplied normally closed dry contact shall be able to stop the motor whether in DRIVE or BYPASS mode.

VII.SERVICE CONDITIONS

- A. Ambient temperature, continuous, full speed, full load operation:
 - i. VFD shall be available in enclosure types: UL Type 1 (NEMA 1) and IP20.
 - ii. VFD shall be able to operate at full output current in the temperature range of 0 to 40°C (32 to 104°F).
 - iii. VFD must be capable of operation at 50°C (122°F). The nameplate shall indicate any reduced VFD output current.
 - iv. VFD shall be capable of operation to a minimum of -10°C (14°F) with reduced performance.
- B. VFD shall be capable of operation in an environment with a relative humidity of 0% to 95%, non-condensing.
- C. VFD shall be capable of operation up to an elevation to 1000m (3,280 feet) without de-rating.
- D. VFD shall be capable of full output current with an AC line voltage variation of -10 to +10% from nominal input voltage.
- E. All VFDs shall be plenum rated.
- F. VFD shall require no side clearance for cooling. All power and control wiring shall be done from the bottom.

VIII.QUALITY ASSURANCE

- A. To ensure quality, the VFD shall be tested by the manufacturer. The VFD shall drive a motor connected to a dynamometer at full load and speed and shall be cycled during the automated test procedure.

IX.SUBMITTALS

- A. This specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.
- B. Total harmonic distortion level estimation. If requested, the manufacturer shall perform an analysis to initially demonstrate the supplied equipment will meet the IEEE 519-1992 recommendations after installation. In such instances, the owner or engineer shall provide the manufacturer with detailed electrical power single line diagram showing all impedances in the power path to the VFDs. Analysis shall provide the estimated total harmonic distortion levels. Point of common coupling shall be the secondary of the utility transformer. Any additional harmonic filtering equipment required to meet the IEEE 519-1992 recommendations shall not be the responsibility of the HVAC manufacturer.

X.EXECUTION

- A. Start-up Service - The manufacturer shall provide start-up commissioning of the VFD and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. Sales personnel and other agents who are not factory certified shall not be acceptable as commissioning agents. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system.
- B. Warranty - The VFD shall be warranted by the manufacturer for a period of 36 months from initial start-up or 42 months from date of shipment, whichever is less. The warranty shall include replacement equipment or parts as well as a labor allowance for expenses incurred by the manufacturer to provide factory authorized on-site service.

SECTION 260009 – ELECTRICAL SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 WORK IN EXISTING BUILDINGS

- A. All existing material, fixtures, and equipment that have been removed shall not be used again unless specifically required by the Drawings or Specifications.
- B. Removals, Replacements, Adjustments
 - 1. The Contractor shall remove, relocate, replace, adjust, or adapt, all existing conduit, wiring and other electric equipment or apparatus, as required, to provide a complete installation.
 - 2. The Work shall include, providing all materials, all necessary extensions, connections, cuttings, repairing, adapting and other Work incidental thereto, together with such temporary connections as may be required to maintain service pending the completion of the permanent Work. All Work shall be left in good working order and in a condition equal to the adjacent new or existing Work.
- C. Care in Removing Existing Conductors
 - 1. The Contractor shall use due care and diligence in removing existing conductors from existing conduits to prevent conductors from breaking and becoming an irretrievable obstruction within the conduits.
- D. Cutting and Repairing
 - 1. Whenever the cutting, or drilling, or removal of any part of the structure (ceilings, walls, floors, shelving, bookcases, partitions, etc.), is required to remove, relocate, alter or install any article of electrical equipment (including conduits, boxes, fittings, etc.), the Contractor shall perform all cutting, drilling, etc., and remove the section of structure required. After removal and installation of the electric equipment, the Contractor shall repair the section of structure, as directed by the Schools, Architect and contract documents, with new materials, equal to that of adjacent structure of the same type.

Note that in general, all holes through existing structures for conduit installation shall be core drilled, unless prior written approval is provided by the School.

Contractor shall use extreme care when core drilling to avoid damaging the existing infrastructure.

- 2. Whenever holes are cut in fire-rated walls or floor slabs to permit the installation of conduit or electrical equipment, these holes shall be repaired with material that will restore the fire rating of the wall or floor slab to its original condition.

3. The Contractor shall paint all repaired areas of the building. The paint shall match the paint of adjacent surface areas, or extend to the nearest architectural break-line, as directed.
 4. Wherever any part of the structure is marred or damaged, the Contractor shall repair the damaged or marred areas of the structure.
 5. Where a piece of electrical equipment is removed, the Contractor shall finish that part of the surface to match surroundings.
- E. Damaged Apparatus: Should any damage, due to the execution of this Contract, occur to the furniture, fixtures, or any equipment or apparatus, such damage shall be properly repaired and/or replaced by the Contractor without charge.
- F. Non-Interruption of Services
1. It is imperative that all existing services (electric, light, power, fire alarm, telecommunications, etc.) be always kept in operation, unless prior written approval is received from the Authority.
 2. Provide fire watch services, as necessary, during disruption of fire alarm system.

1.2 TESTS

- A. The Contractor shall demonstrate to the Authority operation of all equipment and systems. All tests shall be completed to the satisfaction of the Authority. Each test shall be performed as indicated in the individual specification section.

1.3 CLEANING AND REPAIR

- A. On completion of installation, inspect interior and exterior of installed equipment. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.
- B. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, electrical equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

END OF SECTION 260009

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Supplemental requirements applicable to Work specified in Division 26.

B. Related Requirements:

1. Section 01 00 00 "General requirements" for coordination, shop drawings, installation, testing, and inspection requirements.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. A: Ampere, unit of electrical current.
2. AC or ac: Alternating current.
3. AFCI: Arc-fault circuit interrupter.
4. AIC: Ampere interrupting capacity.
5. AL, Al, or ALUM: Aluminum.
6. ASD: Adjustable-speed drive.
7. ATS: Automatic transfer switch.
8. AWG: American wire gauge; see ASTM B258.
9. BAS: Building automation system.
10. BIL: Basic impulse insulation level.
11. BIM: Building information modeling.
12. CAD: Computer-aided design or drafting.
13. CB: Circuit breaker.
14. CO/ALR: Copper-aluminum, revised.
15. CU or Cu: Copper.
16. CU-AL or AL-CU: Copper-aluminum.
17. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
18. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
19. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
20. dBm: Decibel absolute power with respect to 1 mW.
21. DC or dc: Direct current.
22. DCOA: Designated critical operations area.
23. DDC: Direct digital control (HVAC).
24. EGC: Equipment grounding conductor.
25. EMF: Electromotive force.

- 26. EMI: Electromagnetic interference.
- 27. EPM: Electrical preventive maintenance.
- 28. EPS: Emergency power supply.
- 29. EPSS: Emergency power supply system.
- 30. ESS: Energy storage system.
- 31. fc: Footcandle, a unit of illuminance equal to one lumen per square foot.
- 32. FLC: Full-load current.
- 33. ft.: Foot.
- 34. GEC: Grounding electrode conductor.
- 35. GFCI: Ground-fault circuit interrupter.
- 36. GFPE: Ground-fault protection of equipment.
- 37. GND: Ground.
- 38. HACR: Heating, air conditioning, and refrigeration.
- 39. HDPE: High-density polyethylene.
- 40. HID: High-intensity discharge.
- 41. HP or hp: Horsepower.
- 42. HVAC: Heating, ventilating, and air conditioning.
- 43. Hz: Hertz.
- 44. IBT: Intersystem bonding termination.
- 45. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
- 46. IP: Ingress protection rating (enclosures); Internet protocol (communications).
- 47. IR: Infrared.
- 48. IS: Intrinsically safe.
- 49. IT&R: Inspecting, testing, and repair.
- 50. ITE: Information technology equipment.
- 51. kAIC: Kiloampere interrupting capacity.
- 52. kcmil or MCM: One thousand circular mils.
- 53. kV: Kilovolt.
- 54. kVA: Kilovolt-ampere.
- 55. kVA_r or kVAR: Kilovolt-ampere reactive.
- 56. kW: Kilowatt.
- 57. kWh: Kilowatt-hour.
- 58. LAN: Local area network.
- 59. lb: Pound (weight).
- 60. LCD: Liquid-crystal display.
- 61. LCDI: Leakage-current detector-interrupter.
- 62. LED: Light-emitting diode.
- 63. LRC: Locked-rotor current.
- 64. MCC: Motor-control center.
- 65. MG set: Motor-generator set.
- 66. MLO: Main lugs only.
- 67. MVA: Megavolt-ampere.
- 68. mW: Milliwatt.
- 69. MW: Megawatt.
- 70. MWh: Megawatt-hour.
- 71. NC: Normally closed.
- 72. NiCd: Nickel cadmium.
- 73. NIU: Network interface unit.
- 74. NO: Normally open.
- 75. NPT: National (American) standard pipe taper.
- 76. OCPD: Overcurrent protective device.

77. PCS: Power conversion system.
78. PCU: Power-conditioning unit.
79. PF or pf: Power factor.
80. PoE: Power over Ethernet.
81. PV: Photovoltaic.
82. PVC: Polyvinyl chloride.
83. pW: Picowatt.
84. RFI: Radio-frequency interference (electrical); Request for interpretation (contract).
85. RMS or rms: Root-mean-square.
86. RPM or rpm: Revolutions per minute.
87. SCADA: Supervisory control and data acquisition.
88. SCR: Silicon-controlled rectifier.
89. SPD: Surge protective device.
90. sq.: Square.
91. SWD: Switching duty.
92. TCP/IP: Transmission control protocol/Internet protocol.
93. TEFC: Totally enclosed fan-cooled.
94. TR: Tamper resistant.
95. TVSS: Transient voltage surge suppressor.
96. UL: Underwriters Laboratories, Inc. (standards) or UL LLC (services).
97. UL CCN: UL Category Control Number.
98. UPS: Uninterruptible power supply.
99. USB: Universal serial bus.
100. UV: Ultraviolet.
101. V: Volt, unit of electromotive force.
102. V(ac): Volt, alternating current.
103. V(dc): Volt, direct current.
104. VA: Volt-ampere, unit of complex electrical power.
105. VAR: Volt-ampere reactive, unit of reactive electrical power.
106. VFC: Variable-frequency controller.
107. VOM: Volt-ohm-multimeter.
108. VPN: Virtual private network.
109. W: Watt, unit of real electrical power.
110. Wh: Watt-hour, unit of electrical energy usage.
111. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit.
7. EPEC-40: Schedule 40 electrical HDPE underground conduit.
8. EPEC-80: Schedule 80 electrical HDPE underground conduit.
9. EPEC-A: Type A electrical HDPE underground conduit.
10. EPEC-B: Type B electrical HDPE underground conduit.
11. ERMC: Electrical rigid metal conduit.
12. ERMC-A: Aluminum electrical rigid metal conduit.
13. ERMC-S: Steel electrical rigid metal conduit.

14. ERM-C-S-G: Galvanized-steel electrical rigid metal conduit.
15. ERM-C-S-PVC: PVC-coated-steel electrical rigid metal conduit.
16. ERM-C-SS: Stainless steel electrical rigid metal conduit.
17. FMC: Flexible metal conduit.
18. FMC-A: Aluminum flexible metal conduit.
19. FMC-S: Steel flexible metal conduit.
20. FMT: Steel flexible metallic tubing.
21. FNMC: Flexible nonmetallic conduit. See LFNC.
22. HDPE: See EPEC.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERM-C-S-G.
38. RMC: See ERM-C.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.

15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: Moisture-, heat-, and oil-resistant thermoplastic cable (machine tool wiring).
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: Thermoset rubber, heat-resistant cable (high heat).
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.

- 65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
- 66. THHW: Thermoplastic, heat- and moisture-resistant cable.
- 67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
- 68. TW: Thermoplastic, moisture-resistant cable.
- 69. UF: Underground feeder and branch-circuit cable.
- 70. USE: Underground service-entrance cable.
- 71. XHH: Cross-linked polyethylene, heat-resistant cable.
- 72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Definitions:

- 1. Basic Impulse Insulation Level: Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
- 2. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
- 3. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
- 4. Designated Seismic System: A system component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.
- 5. Direct Buried: Installed underground without encasement in concrete or other protective material.
- 6. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:
 - a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
 - b. Concrete Box: A box intended for use in poured concrete.
 - c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
 - d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
 - e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
 - f. Device Box: A box with provisions for mounting a wiring device directly to the box.
 - g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
 - h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
 - i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
 - j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.

- k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
 - l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
 - m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
 - n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
 - o. Raised-Floor Box: A floor box intended for use in raised floors.
 - p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
 - q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
 - r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
 - s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
 - t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.
- 7. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
 - 8. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
 - 9. Jacket: A continuous nonmetallic outer covering for conductors or cables.
 - 10. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
 - 11. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
 - 12. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
 - 13. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
 - 14. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
 - 15. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
 - 16. Sheath: A continuous metallic covering for conductors or cables.
 - 17. UL Category Control Number: An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.

18. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
- a. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by Class 2 or Class 3 power supplies having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
 - b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation, in contrast to control-voltage devices that require or contain transformer power supplies. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
 - c. Low Voltage: Listed and labeled for use in circuits supplied by Class 1 or other power supplies having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.
 - d. Medium Voltage: Listed and labeled for use in circuits supplied by a power supply having rated output greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Parts I and II.

1.3 COORDINATION

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:
1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Owner's written permission.
 3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:
 - a. Exercising generators.
 - b. Emergency lighting.
 - c. Elevators.
 - d. Fire-alarm systems.

1.4 SEQUENCING

- A. Conduct and submit results of power system studies, short circuit study and arc flash Hazard analysis before submitting Product Data and Shop Drawings for electrical equipment.

1.5 SCHEDULING

- A. Coordinate with school for scheduling .

1.6 ACTION SUBMITTALS

- A. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, on which the

following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment and suspension systems will be attached.
3. Size and location of access panels on ceilings.
4. Elevation, size, and route of sprinkler piping.
5. Elevation, size, and route of plumbing piping.
6. Elevation, size, and route of ductwork.
7. Elevation, size, and route of cable tray.
8. Elevation, size, and route of conduit.
9. Elevation and size of wall-mounted and ceiling-mounted equipment.
10. Access panels.
11. Sprinklers.
12. Air inlets and outlets.
13. Control modules.
14. Luminaires.
15. Communications devices.
16. Speakers.
17. Security devices.
18. Fire-alarm devices.
19. Indicate clear dimensions for maintenance access in front of equipment.
20. Indicate dimensions of fully-open access doors.

B. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

C. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:
 - a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
 - b. Indicate clear dimensions for fence gates and wall openings.
 - c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
 - d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
 - e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways .
 - f. Dimensioned working clearances and dedicated areas around electrical equipment.

D. Coordination Drawings for Electrical service room and ATS rooms:

1. Provide coordination drawing to show all the electrical equipment in large scale plan and elevation including wire trough, conduits along with all the code required clearances between equipment and walls for code compliance installation and review by EOR.

1.7 INFORMATIONAL SUBMITTALS

- A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of ARC-Flash Hazard Analysis.
3. Submission of specified coordination drawings.
4. Submission of action submittals specified in Division 26.
5. Orders placed for major electrical equipment.
6. Arrival of major electrical equipment on-site.
7. Preinstallation meetings specified in Division 26.
8. Utility service outages.
9. Utility service inspection and activation.
10. Mockup reviews.
11. Closing of walls and ceilings containing electrical Work.
12. System startup, testing, and commissioning activities for major electrical equipment.
13. System startup, testing, and commissioning activities for emergency lighting.
14. System startup, testing, and commissioning activities for automation systems (BMS, lighting, Emergency generator, HVAC, fire alarm, fire pump, etc.).
15. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
16. Requests for special inspections.
17. Requests for inspections by authorities having jurisdiction.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:

1. Provide emergency, operation, and maintenance manuals for each system, equipment, and device listed below:
 - a. Transformer, Panel board, switchboard, Fusible Interrupting switch and Lighting control, etc. .
2. Include the following information:
 - a. Manufacturer's operating specifications.
 - b. User's guides for software and hardware.
 - c. Schedule of maintenance material items recommended to be stored at Project site.
 - d. Detailed instructions covering operation under both normal and abnormal conditions.
 - e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
 - f. List of load-current and overload-relay heaters with related motor nameplate data.

- g. List of lamp types and photoelectric relays used on Project, with ANSI and manufacturers' codes.
 - h. Manufacturer's instructions for setting field-adjustable components.
 - i. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
 - j. Exterior pole inspection and repair procedures.
- B. Software and Firmware Operational Documentation: Provide software and firmware operational documentation in Facility EPM Program Binders, including the following:
 - 1. Software operating and upgrade manuals.
 - 2. Names, versions, and website addresses for locations of installed software.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
 - 5. Testing and adjusting of panic and emergency power features.
 - 6. For lighting controls include the following:
 - a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
 - b. Operation of adjustable zone controls.
- C. Software:
 - 1. Program Software Backup: Provide username and password for approved online or cloud solution .

1.1 MOCKUPS

- A. Simple Mockups for Coordinating Accessibility of Electrical Devices around Fixed Furnishings and Equipment:
 - 1. Build simple mockups using art supplies and other inexpensive materials for verification of general arrangement, actual dimensions, and accessibility of rooms selected by Architect prior to fabrication and installation of Work. Depict products from all Divisions requiring coordination including, but not limited to, fixed furnishings, casework, outlet covers and plates, HVAC controls, exposed raceway, exposed plumbing, equipment, and signage.
- B. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.2 FIELD CONDITIONS

- A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 26 must be complied.

PART 2 - EXECUTION

2.1 INSTALLATION OF ELECTRICAL WORK

- A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

2.2 SYSTEM STARTUP

- A. Commissioning Activities:
 - 1. Provide commissioning of lighting control system

2.3 FIELD QUALITY CONTROL

- A. Administrant for Low-Voltage Electrical Tests and Inspections:
 - 1. Engage qualified testing and inspecting agency to administer and perform tests and inspections.
 - 2. Administer and perform tests and inspections.
- B. Administrant for Control-Voltage Electrical Tests and Inspections:
 - 1. Engage qualified control-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
 - 2. Administer and perform tests and inspections.
- C. Administrant for Field Tests and Inspections of Lighting Installations:
 - 1. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
 - 2. Administer and perform tests and inspections.

PART 3 - CLOSEOUT ACTIVITIES

A. Demonstration:

- 1. With assistance from factory-authorized service representatives, demonstrate to Owner's maintenance and clerical personnel and building occupants how to operate the following systems and equipment:
 - a. Lighting control devices specified in Section 260923 "Lighting Control Devices."
 - b. Lighting control systems specified in Section 260943 "Relay Based Lighting Controls."
 - c. All other items specified in individual specification sections under division 26.
- 2. Provide video recordings of demonstrations to Owner.

B. Training:

1. With assistance from factory-authorized service representatives, train Owner's maintenance personnel on the following topics:
 - a. How to adjust, operate, and maintain devices specified in Section 260923 "Lighting Control Devices."
 - b. How to adjust, operate, and maintain hardware and software specified in Section 260943 "Relay-Based Lighting Controls."
 - c. How to adjust, operate, and maintain control modules specified in Section 262416 "Electronically Operated Circuit-Breaker Panelboards."
 - d. How to adjust, operate, and maintain equipment specified in Section 262913 "Manual and Magnetic Motor Controllers."
 - e. How to adjust, operate, and maintain luminaires specified in Section 265119 "LED Interior Lighting."
 - f. How to adjust, operate, and maintain luminaires and photoelectric controls specified in Section 265619 "LED Exterior Lighting."
 - g. How to adjust, operate, and maintain Exit signs specified in Section 265213 "EXIT Lighting."
2. Provide video recordings of training sessions to Owner.

END OF SECTION 260010

SECTION 260519 - ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Fire-alarm wire and cable.
4. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For each conductor and cable indicating lead content.
2. Product Data: For recycled content, indicating postconsumer and pre-consumer recycled content and cost.
3. Product Data: For solvents and adhesives, indicating VOC content.
4. Laboratory Test Reports: For solvents and adhesives, indicating compliance with requirements for low-emitting materials.

C. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Insulated Cable in Raceways:
 - 1. Material: Single conductor copper cable conforming to ASTM B8 with abrasion resistant, moisture and heat resistant polyvinyl chloride insulated, nylon jacketed rated 90C in dry locations and 90C in wet locations. Cable shall be listed by UL as Type THWN-2. All underground raceways for power wiring shall be wired using extra heavy cross-linked polyethylene wire insulation, rated type USE-2/rhw-2.
 - 2. Where cable is designated as multiconductor on the Drawings (10/c for example), the conductors shall have an overall PVC jacket.
 - 3. Wire Sizes: Not smaller than No. 12 AWG for power and lighting and No. 14 AWG for control.
 - 4. Stranding: All 600-volt cable shall be stranded.
 - 5. Product and Manufacturer: Provide material manufactured by one of the following:
 - a. Alpha Wire Company...
 - b. American Bare Conductor.
 - c. Southwire Company
 - d. Or approved equal.
- C. Cable Connectors, Splices and Terminals, Solderless Type:

For stranded wire sizes up to #6 AWG, use compression type.

- 1. Product and Manufacturer: Provide one of the following:
 - a) Sta-Kon.
 - b) Burndy Hylug.
 - c) Or approved equal.
- 2. For sizes #4 AWG and above, use either compression type or bolted type with silver plated contact faces.

3. For sizes #250 MCM and larger, use connectors and terminals with at least 2 cable clamping elements or compression indents and provision for at least 2 bolts for joining to apparatus terminal.

D. Cable Markers: Product and Manufacturer: Provide one of the following:

1. Omni-Grip by W.H. Brady Company.
2. Or approved equal.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alpha Wire Company.
 2. American Bare Conductor.
 3. Southwire Company.
- C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. Comply with UL 1569.
 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
1. Single circuit .
 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors .
- F. Ground Conductor: Insulated .
- G. Conductor Insulation:
1. Type TFN/THHN/THWN-2: Comply with UL 83.
 2. Type XHHW-2: Comply with UL 44.
 3. Type USE/RHW for wet and dry location
 4. Type MI for emergency as indicated in dwg.
- H. Armor: Steel , interlocked.

- I. Jacket: PVC applied over armor.

2.3 FIRE-ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied Wire & Cable Inc.
 - 2. Genesis Cable Products; Honeywell International, Inc.
 - 3. Vent (PYROTENAX).
 - 4. Prysmian Cables and Systems; Prysmian Group North America.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
 - 1. Lead Content: Less than 300 parts per million.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 14 AWG .
 - 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
 - 1. Low-Voltage Circuits: No. 14 AWG, minimum, in pathway.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
 - 3. Multiconductor Armored Cable: NFPA 70, plenum rated red colored jacket metal clad Type MC-FPLP AND MC-FPLR, copper conductors, cables for recessed installation only.

2.4 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M Electrical Products.
 - 2. ABB, Electrification Products Division.
 - 3. Hubbell Incorporated, Power Systems.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper .
2. Type: One Two hole with standard barrels.
3. Termination: Compression .

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; stranded for all sizes

B. Branch Circuits:

1. Copper; stranded for all sizes
2. Power-Limited Fire Alarm and Control: Copper; stranded for all sizes

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in conduit.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in conduit.
- C. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway, Metal-clad cable, Type MC- except for homerun circuits to an electrical panelboard.
- E. Raceway from the electrical panelboard shall be provided to a junction box located above the ceiling in the area that the branch circuit serves. Metal-clad cable may be used from this junction box for lighting fixtures, lighting control devices, general use receptacles and for other similar 20A branch circuits.

1.1 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

1.2 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

- A. Comply with NFPA 72.
- B. Wiring Method: Install wiring in metal pathway.
 - 1. Install plenum rated red colored jacket metal clad cable type MC-FPLP and MC-FPLR in all recessed installation in ceiling and wall.
 - 2. Install 2-hour fire rated fire alarm cable in galvanized ¾" steel conduit in the following locations:
 - a. Where subject to physical damage by normal building use.
 - b. All exposed exterior installation, mechanical room, electrical room, elevator hoist way, and elevator machine room.
 - c. All exposed conduit installation below 96" AFF
 - d. Passing through a floor or wall.
 - e. All other locations as indicated in NFPA 70 and 72.
 - 3. All exposed interior installation other than the location indicated in item # B(2) above shall be installed in minimum ¾" EMT conduit.
 - 4. Fire alarm cable that is not metal clad or not installed in race way is not permitted.
 - 5. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.
 - a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
 - 6. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

- E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.
- F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.
- G. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

1.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.
- D. Comply with requirements in Section 284621 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

1.4 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

1.5 TESTING

- A. Test each electrical circuit after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.
- B. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service with a 1000 volt Megger whose rating is suitable for the tested circuit. Tests shall meet with the applicable specifications of ICEA S-95658/NEMA WC70.

- C. The insulation resistance for any given conductor shall not be less than the value recommended by the ICEA or a minimum of 1 megohm for 600-volt and less service, if not ICEA listed. Any cable not meeting the recommended value, or which fails when tested under full load conditions shall be replaced with a new cable for the full length. Furnish the authority with a copy of the "Megger" test report for EOR's review and approval.

1.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior wall, floor and rated wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

1.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Related Requirements:
 - 1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.
- B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:
 - 1. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
 - a. Test wells.
 - b. Ground rods.
 - c. Grounding arrangements and connections for separately derived systems.
 - d. Ground Bus .
 - 2. Instructions for periodic testing and inspection of grounding features at test wells based on NFPA 70B .
 - a. Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
 - b. Include recommended testing intervals.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ABB, Electrification Products Division.
 - 2. ERICO; nVent.
 - 3. Siemens Industry, Inc., Energy Management Division.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction. Use green color insulated copper conductor for equipment grounding.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B3.
 - 2. Stranded Conductors: ASTM B8.
 - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.
- E. Grounding Electrode Conductors: Stranded cable.
- F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- G. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

H. Grounding Bus:

1. Predrilled rectangular bars of annealed copper, 1/4 by 4 inch cross section, with 9/32-inch holes spaced 1-1/8 inch apart. Stand-off insulators for mounting must comply with UL 891 for use in switchboards, 600 V and must be Lexan or PVC, impulse tested at 5000 V.
2. Ground clamp on the main water pipe is to be listed for the application and compatible with the water pipe material, so as to prevent corrosion.
3. Conductor connecting bus bar to the main water pipe to be sized and installed as per electrical code.
4. Grounding conductors' conduits to be connected to the grounding bus as per electrical code.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Mechanical-Type Bus-Bar Connectors: Cast silicon bronze, solderless compression exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- D. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- H. Conduit Hubs: Mechanical type, terminal with threaded hub.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with [hex head bolt] [socket set screw].
- J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- K. Lay-in Lug Connector: Mechanical type,

- L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- N. Straps: Solid copper, cast-bronze clamp . Rated for 600 A.
- O. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.
- P. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- Q. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with zinc-plated bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and copper ground connector.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel ; 3/4 inch by 10 ft. .
- B. Ground Plates: 1/4 inch thick, hot-dip galvanized.
- C. Underground metal water piping.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 30 inch below grade.
- C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, telecom room, AV equipment room and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors must be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including dampers, humidifiers, etc. Bond conductor to each unit and to air duct.
- C. Water Heater Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.
 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
2. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

F. Grounding of Cable Tray: Install insulated copper grounding conductors and ground each section of cable tray and connect to building grounding system.

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, the contractor is responsible to reduce ground resistance as recommended by national electric codes and notify Architect promptly.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

B. Provide supporting devices and accessories required for a complete system and its proper operation.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers and supports.

1.3 INFORMATIONAL SUBMITTALS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; Atkore International.
 - b. B-line; Eaton, Electrical Sector.
 - c. CADDY; nVent.
 - 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 3. Material for Channel, Fittings, and Accessories: Galvanized steel .
 - 4. Channel Width: 1-5/8 inch .
 - 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Galvanized steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: Stainless steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 SELECTION

- A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA NEIS 101
 2. NECA NEIS 102.
 3. NECA NEIS 105.
 4. NECA NEIS 111.
- B. Comply with requirements for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps .
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 INSTALLATION OF SUPPORTS

- A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT may be supported by openings through structure members, in accordance with NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To New Concrete: Bolt to concrete inserts.
 - 2. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
 - 3. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 Spring-tension clamps.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Type EMT-SS raceways and elbows.
 2. Type EMT-S raceways and elbows.
 3. Type ENT raceways and fittings.
 4. Type ERMC-SS raceways, elbows, couplings, and nipples.
 5. Type ERMC-S raceways, elbows, couplings, and nipples.
 6. Type FMC-S raceways.
 7. Type IMC raceways.
 8. Type LFMC raceways.
 9. Type PVC raceways and fittings.
 10. Fittings for conduit, tubing, and cable.
 11. Threaded metal joint compound.
 12. Solvent cements.
 13. In Carpet Connectrac Powered Wireway-3.7" wide.
 14. Stainless Steel Steelcase thread-floor infeeds-single/dual circuit and components
 15. Metallic outlet boxes, device boxes, and covers.
 16. Termination boxes.
 17. Cabinets, cutout boxes, junction boxes, and pull boxes.
 18. Cover plates for device boxes.
 19. Hoods for outlet boxes.
- B. Provide raceways, fittings, supporting devices, boxes and accessories required for a complete system and its proper operation.
- C. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, floor furnitures, HVAC equipment, fire-suppression system, and partition assemblies.
- D. Related Requirements:
1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Wireways and auxiliary gutters.

2. In Carpet Connectrac Powered Wireway-3.7" wide.
 3. Stainless Steel Steelcase thread-floor infeeds-single/dual circuit and components
 4. Floor boxes/hubs.
 5. Cabinets and cutout boxes.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details. Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.
- C. Samples: For wireways , surface raceways, and floor boxes for colors and textures specified.

PART 2 - PRODUCTS

2.1 TYPE EMT-SS RACEWAYS AND ELBOWS

- A. Stainless Steel Electrical Metal Tubing (EMT-SS) and Elbows:
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Allied Tube & Conduit; Atkore International.
 - b. Calconduit; Atkore International.
 - c. Emerson Electric Co.
 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 797A and UL Category Control Number FJMX.
 - 2) Material: Stainless steel.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

2.2 TYPE EMT-S RACEWAYS AND ELBOWS

- A. Steel Electrical Metal Tubing (EMT-S) and Elbows:
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Allied Tube & Conduit; Atkore International.
 - b. Calconduit; Atkore International.
 - c. Emerson Electric Co.
 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 797 and UL Category Control Number FJMX.
 - 2) Material: Steel.
 - 3) Exterior Coating: Alternate corrosion-resistant coating.
 - 4) Interior Coating: Zinc .

- c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

2.3 TYPE ENT RACEWAYS AND FITTINGS

- A. Electrical Nonmetallic Tubing (ENT) and Fittings (for use in underground installation outside of building footprint only):
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Cantex Inc.
 - c. JM Eagle; J-M Manufacturing Co., Inc.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 1653 and UL Category Control Number FKHU.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - d. Fittings:
 - 1) Mechanically Attached Fittings: UL 1653.
 - 2) Solvent-Attached Fittings: UL 651.

2.4 TYPE ERM-C-SS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

- A. Stainless Steel Electrical Rigid Metal Conduit (ERM-C-SS), Elbows, Couplings, and Nipples:
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Allied Tube & Conduit; Atkore International.
 - c. Calconduit; Atkore International.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 6A and UL Category Control Number DYWV.
 - 2) Material: Stainless steel.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

2.5 TYPE ERM-C-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

- A. Galvanized-Steel Electrical Rigid Metal Conduit (ERM-C-S-G), Elbows, Couplings, and Nipples:
 - 1. Manufacturers: Subject to compliance with requirements, undefined:

- a. Allied Tube & Conduit; Atkore International.
 - b. Calconduit; Atkore International.
 - c. Crouse-Hinds; Eaton, Electrical Sector.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 6 and UL Category Control Number DYIX.
 - 2) Exterior Coating: Zinc.
 - 3) Interior Coating: Zinc .
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.
- B. PVC-Coated-Steel Electrical Rigid Metal Conduit (ERMC-S-PVC), Elbows, Couplings, and Nipples:
- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Bluesteel Services LLC.
 - c. Calbond; Atkore International.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 6 and UL Category Control Number DYIX.
 - 2) Exterior Coating: PVC complying with NEMA RN 1.
 - 3) Interior Coating: Zinc .
 - 4) Fittings for PVC-Coated Conduit:
 - a) Minimum coating thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
 - b) Conduit bodies must be Form 8 with an effective seal and a positive placement feature to ease and assure proper installation. Certified results confirming seal performance at 15 psig (positive) and 25 in. of mercury (vacuum) for 72 hours must be available. Conduit bodies must be supplied with plastic-encapsulated stainless steel cover screws.
 - c) Form 2 inch long or one pipe diameter long, whichever is less, PVC sleeve at openings of female fittings, except unions. Inside sleeve diameter must be matched to outside diameter of metal conduit.
 - d) PVC coating on the outside of conduit couplings must be protected from tool damage during installation.
 - e) Female threads on fittings and couplings must be protected by urethane coating.
 - f) Fittings must be from same manufacturer as conduit.
 - g) Beam clamps and U bolts must be formed and sized to fit outside diameter of coated conduit. Plastic-encapsulated nuts must cover the exposed portions of threads.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

- 3) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
- 4) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

2.6 TYPE FMC-S RACEWAYS

A. Steel Flexible Metal Conduit (FMC-S):

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Electri-Flex Company.
2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standard: UL 1 and UL Category Control Number DXUZ.
 - 2) Material: Steel.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

2.7 TYPE IMC RACEWAYS

A. Steel Electrical Intermediate Metal Conduit (IMC):

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Allied Tube & Conduit; Atkore International.
 - c. Calconduit; Atkore International.
2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standard: UL 1242 and UL Category Control Number DYBY.
 - 2) Exterior Coating: Alternative corrosion-resistant coating.
 - 3) Interior Coating: Zinc .
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Colors: As indicated on Drawings.

2.8 TYPE LFMC RACEWAYS

A. Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Anaconda Sealtite; Anamet Electrical, Inc.
 - c. Electri-Flex Company.

2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standard: UL 360 and UL Category Control Number DXHR.
 - 2) Material: Steel.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
3. Colors: As indicated on Drawings.

B. Stainless Steel Liquidtight Flexible Metal Conduit (LFMC-SS):

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Electri-Flex Company.
2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standard: UL 360 and UL Category Control Number DXHR.
 - 2) Material: Stainless steel.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
3. Colors: As indicated on Drawings.

2.9 TYPE PVC RACEWAYS AND FITTINGS (for use in underground installation outside of building footprint only):

A. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Calconduit; Atkore International.
 - c. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 651 and UL Category Control Number DZYR.
 - 2) Dimensional Specifications: Schedule 40.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Markings: For directional boring applications.

B. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Calconduit; Atkore International.
 - c. JM Eagle; J-M Manufacturing Co., Inc.
2. Applicable Standards:

- a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 651 and UL Category Control Number DZYR.
 - 2) Dimensional Specifications: Schedule 80.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
 - 2) Markings: For directional boring applications.
- C. Type A Rigid PVC Concrete-Encased Conduit (PVC-A) and Fittings:
- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Southern Pipe, Inc.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 651 and UL Category Control Number DZYR.
 - 2) Dimensional Specifications: Type A.
 - c. Options:
 - 1) Minimum Trade Size: 3/4 inch .
- D. Type EB Rigid PVC Concrete-Encased Underground Conduit (PVC-EB) and Fittings:
- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. JM Eagle; J-M Manufacturing Co., Inc.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 651 and UL Category Control Number DZYR.
 - 2) Dimensional Specifications: Type EB.
 - c. Options:
 - 1) Minimum Trade Size: 4 inch .

2.10 FITTINGS FOR CONDUIT, TUBING, AND CABLE

- A. Fittings for Type ERM, Type IMC, and Type PVC Raceways:
- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Crouse-Hinds; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514B and UL Category Control Number DWTT.
 - 2) Material: Steel Die cast.
 - 3) Coupling Method: Compression coupling .

- c. Options:
 - 1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
 - 2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
 - B. Fittings for Type EMT Raceways:
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Allied Tube & Conduit; Atkore International.
 - c. Calconduit; Atkore International.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514B and UL Category Control Number FKAV.
 - 2) Material: Steel Die cast.
 - 3) Coupling Method: Compression coupling .
 - c. Options:
 - 1) Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
 - 2) Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.
 - C. Fittings for Type LFMC Raceways:
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Liquid Tight Connector Co.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514B and UL Category Control Number DXAS.
- 2.11 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT
- A. Manufacturers: Subject to compliance with requirements, undefined:
 - 1. ABB, Electrification Products Division.
 - B. Applicable Standards:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and approved by authorities having jurisdiction for application to threaded conduit assemblies.
 - 2. General Characteristics:
 - a. Reference Standards: UL 2419 and UL Category Control Number FOIZ.

2.12 SOLVENT CEMENTS

A. Solvent Cements for Type PVC Raceways and Fittings:

1. Applicable Standards:
 - a. General Characteristics:
 - 1) Reference Standards: As recommended by conduit manufacturer in accordance with UL 514B and UL Category Control Number DWTT.

2.13 METALLIC OUTLET BOXES, DEVICE BOXES, AND COVERS

A. Metallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Crouse-Hinds; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514A and UL Category Control Number QCIT.
 - c. Options:
 - 1) Material: Sheet steel .
 - 2) Sheet Metal Depth: Minimum 2 inch .
 - 3) Cast-Metal Depth: Minimum 2.4 inch .
 - 4) Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb more than 50 lb and marked with maximum allowable weight.
 - 5) Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

B. Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Crouse-Hinds; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514A and UL Category Control Number QCIT.

C. Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Arlington Industries, Inc.
 - c. Crouse-Hinds; Eaton, Electrical Sector.
3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514A and UL Category Control Number QCIT.
 - c. Options:
 - 1) Material: Sheet steel .
 - 2) Sheet Metal Depth: minimum 2 inch .
 - 3) Cast-Metal Depth: minimum 2.4 inch .
 - 4) Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing .
 - 5) Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

D. Metallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.
2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. AFC Cable Systems; Atkore International.
 - c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514A and UL Category Control Number QCIT.

2.14 TERMINATION BOXES

- A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.
- B. Termination Boxes and Termination Bases for Installation on Line Side of Service Equipment:
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. B-line; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

- b. General Characteristics:
 - 1) Reference Standards: UL 1773 and UL Category Control Number XCKT.
 - 2) Listed and labeled for installation on line side of service equipment.
- C. Termination Boxes and Termination Bases for Installation on Load Side of Service Equipment:
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. B-line; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
 - 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 1773 and UL Category Control Number XCKT.
 - 2) Listed and labeled for installation on load side of service equipment.

2.15 CABINETS, CUTOFF BOXES, JUNCTION BOXES, AND PULL BOXES

- A. Indoor Sheet Metal Cabinets:
 - 1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
 - 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Adalet.
 - c. B-line; Eaton, Electrical Sector.
 - 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number CYIV.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
 - c. Options:
 - 1) Degree of Protection: Type 1
- B. Indoor Sheet Metal Cutout Boxes:
 - 1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
 - 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Adalet.
 - c. B-line; Eaton, Electrical Sector.
 - d. Crouse-Hinds; Eaton, Electrical Sector.
 - 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:

- 1) Reference Standards: UL Category Control Number CYIV.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
- c. Options:
 - 1) Degree of Protection: Type 1

C. Indoor Sheet Metal Junction and Pull Boxes:

- 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
- 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Adalet.
 - b. B-line; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
- 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number BGUZ.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
 - c. Options:
 - 1) Degree of Protection: Type 1.

D. Indoor Cast-Metal Junction and Pull Boxes:

- 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
- 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Adalet.
 - b. Crouse-Hinds; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
- 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number BGUZ.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
 - c. Options:
 - 1) Degree of Protection: Type 1

E. Outdoor Sheet Metal Cabinets:

- 1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
- 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Adalet.
 - c. B-line; Eaton, Electrical Sector.
- 3. Applicable Standards:

- a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
- b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number CYIV.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
- c. Options:
 - 1) Degree of Protection: Type 3X Type 3R .

F. Outdoor Sheet Metal Cutout Boxes:

- 1. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
- 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Adalet.
 - c. B-line; Eaton, Electrical Sector.
- 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number CYIV.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
 - c. Options:
 - 1) Degree of Protection: Type 3X Type 3R .

G. Outdoor Sheet Metal Junction and Pull Boxes:

- 1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
- 2. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Adalet.
 - b. B-line; Eaton, Electrical Sector.
 - c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
- 3. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL Category Control Number BGUZ.
 - a) Non-Environmental Characteristics: UL 50.
 - b) Environmental Characteristics: UL 50E.
 - c. Options:
 - 1) Degree of Protection: Type 3X Type 3R .

2.16 COVER PLATES FOR DEVICES BOXES

A. Nonmetallic Cover Plates for Device Boxes:

- 1. Manufacturers: Subject to compliance with requirements, undefined:

- a. ABB, Electrification Products Division.
- b. Arlington Industries, Inc.
- c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
- 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
 - 2) Wallplate-Securing Screws: Metal with head color to match wallplate finish.
 - c. Options:
 - 1) Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
 - 2) Wallplate Material: 0.060 inch thick high-impact thermoplastic (nylon) with smooth finish and color matching wiring device .
 - 3) Color: White Office White As indicated on architectural Drawings.

2.17 HOODS FOR OUTLET BOXES

A. Retractable or Reattachable Hoods for Outlet Boxes:

- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Raco Taymac Bell; Hubbell Incorporated, Commercial and Industrial.
- 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
 - 2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
 - 3) Mounts to box using fasteners different from wiring device.
 - c. Options:
 - 1) Provides white, weatherproof, "while-in-use" cover.

B. Extra-Duty, While-in-Use Hoods for Outlet Boxes:

- 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ABB, Electrification Products Division.
 - b. Allied Tube & Conduit; Atkore International.
 - c. Arlington Industries, Inc.
- 2. Applicable Standards:
 - a. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
 - b. General Characteristics:
 - 1) Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
 - 2) Marked "Extra-Duty" in accordance with UL 514D.

- 3) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
- 4) Mounts to box using fasteners different from wiring device.
- c. Options:
 - 1) Provides white, weatherproof, "while-in-use" cover.
 - 2) Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 SELECTION OF RACEWAYS

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.
- B. Outdoors:
 1. Exposed Conduit: ERM C .
 2. Concealed Conduit, Aboveground: ERM C .
 3. Direct-Buried Conduit: PVC-40.
 4. Concrete-Encased Conduit in Trench: PVC-40 .
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFM C.
- C. Indoors:
 1. Exposed and Subject to Physical Damage: ERM C . Raceway locations include the following:
 - a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - b. Mechanical rooms.
 - c. Fire Pump Room
 2. Concealed in Ceilings and Interior Walls and Partitions: IM C EMT.
 3. Damp or Wet Locations: IM C.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFM C .
- D. Stub-ups to Above Recessed Ceilings: Provide EMT, IM C, or ERM C for raceways.
- E. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
 1. ERM C and IM C: Provide threaded type fittings unless otherwise indicated.

3.2 SELECTION OF BOXES AND ENCLOSURES

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.
- B. Degree of Protection:
 - 1. Outdoors:
 - a. Type 3R Type 3 unless otherwise indicated.
 - b. Locations Exposed to Hosedown: Type 6 .
 - c. Locations Subject to Potential Flooding: Type 6P.
 - d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
 - e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X .
 - f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.
 - 2. Indoors:
 - a. Type 1 unless otherwise indicated.
 - b. Damp or Dusty Locations: Type 12 .
 - c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
 - d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12 .
 - e. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: Type 6.
 - f. Locations Exposed to Hosedown: Type 6 .
 - g. Locations Exposed to Brief Submersion: Type 6P.
 - h. Locations Exposed to Prolonged Submersion: Type 6P.
 - i. Locations Exposed to Corrosive Agents: Type 4X .
 - j. Locations Exposed to Spraying Oil or Coolants: Type 13.
- C. Exposed Boxes Installed Less Than 6.5 ft. Above Floor:
 - 1. Provide cast-metal boxes. Boxes with knockouts or unprotected openings are prohibited.
 - 2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF RACEWAYS

- A. Installation Standards:
 - 1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
 - 2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
 - 3. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
 - 4. Comply with NECA NEIS 101 for installation of steel raceways.

5. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
6. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
7. Raceway Terminations at Locations Subject to Moisture or Vibration:

B. General Requirements for Installation of Raceways:

1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft. above finished floor.
3. Install no more than equivalent of three 90-degree bends in conduit run except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted. Support within 12 inch of changes in direction.
4. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
5. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
6. Support conduit within 12 inch of enclosures to which attached.
7. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
8. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - b. Where an underground service raceway enters a building or structure.
 - c. Conduit extending from interior to exterior of building.
 - d. Where otherwise required by NFPA 70.
9. Keep raceways at least 6 inch away from parallel runs of flues and hot-water pipes. Install horizontal raceway runs above water and steam piping.
10. Cut conduit perpendicular to the length. For conduits 2 inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
11. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Requirements for Installation of Specific Raceway Types:

1. Types ERM and IMC:
 - a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to

- threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- 2. Types FMC and LFMC:
 - a. Comply with NEMA RV 3. Provide a maximum of 72 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
- 3. Type PVC:
 - a. Do not install Type PVC conduit where ambient temperature exceeds 75 Degree F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted. PVC can only be used for underground installation outside of the building footprint.
 - b. Comply with manufacturer's written instructions for solvent welding and fittings.
- D. Stub-ups to Above Recessed Ceilings:
 - 1. Provide EMT, IMC, or ERM for raceways.
 - 2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- E. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.
 - 1. ERM-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 2. EMT: Provide compression , fittings. Comply with NEMA FB 2.10.
 - 3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.
- F. Expansion-Joint Fittings:
 - 1. Install in runs of aboveground ERM conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft..
 - 2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 - e. .
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 - 4. Install expansion fittings at locations where conduits cross building or structure expansion joints.
 - 5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

G. Raceways Penetrating Rooms or Walls with Acoustical Requirements:

1. Seal raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.

3.4 INSTALLATION OF SURFACE RACEWAYS

- A. Install surface raceways only where indicated on Drawings.
- B. Install surface raceway with a minimum 2 inch radius control at bend points.
- C. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's written instructions. Tape and glue are unacceptable support methods.

3.5 INSTALLATION OF BOXES AND ENCLOSURES

- A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
- B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
- D. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- E. Locate boxes so that cover or plate will not span different building finishes.
- F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
- G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
- H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
- I. Set metal floor boxes level and flush with finished floor surface.
- J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
- M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
 - 1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
 - 2. Provide gaskets for wallplates and covers.

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.8 CLEANING

- A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeve seal systems.
2. Grout.
3. Foam sealants.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVE SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. BWM Company.
3. CALPICO, Inc.

B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.

1. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.2 GROUT

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. W.R. Meadows, Inc.
- B. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
 - 1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 - 2. Design Mix: 5000 psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.3 FOAM SEALANTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dow Chemical Company (The).
 - 2. Innovative Chemical Products (Building Solutions Group).
- B. Description: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4 inch annular clear space between sleeve and raceway or cable, unless sleeve seal system is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:
1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for wall assemblies.
- C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- E. Underground, Exterior-Wall and Floor Penetrations:
1. Install steel pipe sleeves with integral waterstops. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Install sleeve during construction of floor or wall.
 2. Install steel pipe sleeves. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Grout sleeve into wall or floor opening.

3.2 INSTALLATION OF SLEEVE SEAL SYSTEMS

- A. Install sleeve seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Labels.
 - 3. Tags.
 - 4. Signs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 degree F.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field .
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Grounded/Neutral: White
3. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Grounded/Neutral: Gray
4. Color for Equipment Grounds: Green or Green with a yellow stripe.
5. Colors for Isolated Grounds: Green two or more yellow stripes.

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3. As per NEC 2017. .

E. Equipment Identification Labels:

1. Black letters on a white field.
2. As per NEC 2017.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Champion America.
 - c. emedco.
- B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. HellermannTyton.
 - c. Marking Services, Inc.
- C. Self-Adhesive Wraparound Labels: , 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A'n D Cable Products.
 - b. Brady Corporation.
 - c. Brother International Corporation.
 2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.4 TAGS

- A. Write-on Tags:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brimar Industries, Inc.
 - b. Carlton Industries, LP.
 - c. LEM Products Inc.
 2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.
 3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 SIGNS

- A. Baked-Enamel Signs:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Carlton Industries, LP.
 - b. Champion America.
 - c. emedco.
2. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inches.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 1. Secure tight to surface of conductor, cable, or raceway.

- I. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer load shedding .
- L. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- M. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
 - 3. "UPS."
- N. Vinyl Wraparound Labels:
 - 1. Secure tight to surface at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- O. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
- Q. Self-Adhesive Labels:
 - 1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
- R. Write-on Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using cable ties.
- S. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.

3.2 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels .
 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels self-adhesive wraparound labels snap-around labels to identify the phase.
 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- E. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive equipment labels Baked-enamel warning signs .
 1. Apply to exterior of door, cover, or other access.
 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
 - c. .
- G. Arc Flash Warning Labeling: Self-adhesive labels.
- H. Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs .
- I. Emergency Operating Instruction Signs: Self-adhesive labels Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer load shedding Emergency Generator .
- J. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign .

END OF SECTION 260553

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-commercial grade receptacles, 125 V, 20 A, 2P, 3W.
2. Surge suppression type receptacle 125V, 20A, 2P, 3W.
3. GFCI receptacles, 125 V, 20 A, 2P, 3W.
4. Dual-Controlled Plug Load Receptacles 2P, 3W.
5. Decorator-style devices, 20 A, 2P, 3W.
6. Wall plates.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Coordinate with the receptacle that are part of the furniture being provided by other trades. Provide coordinated shop drawings indicating the furniture mounted receptacles and associated circuiting that matches with the furniture mounted circuit arrangement.

1.3 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports
- B. Coordinate with the receptacles that are part of the furniture being provided by other trades. Provide coordinated shop drawings indicating the furniture mounted receptacles and associated circuiting that matches with the furniture mounted circuit arrangement. Any changes to the circuiting information provided in the contract drawings to match with the circuit information of proposed furniture shall be part of this contract and there will be no additional cost to the contract for these changes.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Straight-blade-type; Commercial Specification Grade minimum; compliance with NEMA WD 1; DSCC WC 596, AND UL 498 and UL 943 2006 Codes.
- E. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: White As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wiring Devices Connected to Essential Electrical System: Red.
 - 3. SPD Devices: Blue.
 - 4. Isolated-Ground Receptacles: Orange As specified above, with orange triangle on face.
- F. Wall Plate Color: For plastic covers, match device color.
- G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

- A. Duplex Receptacles, 125 V, 20 A :
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leviton Manufacturing Co., Inc.
 - b. Pass & Seymour; Legrand North America, LLC.
 - c. Hubbell Inc.
 - 2. Description: Two pole, three wire, and self-grounding.
 - 3. Configuration: NEMA WD 6, Configuration 5-20R.
 - 4. Standards: Comply with UL 498 and FS W-C-596.
- B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leviton Manufacturing Co., Inc.
 - b. Pass & Seymour; Legrand North America, LLC.
 - c. Hubbell Inc.
 - 2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
 - 3. Configuration: NEMA WD 6, Configuration 5-20R.
 - 4. Standards: Comply with UL 498 and FS W-C-596.
 - 5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- C. Weather-Resistant Duplex Receptacle, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leviton Manufacturing Co., Inc.
 - b. Pass & Seymour; Legrand North America, LLC.
 - c. Hubbell Inc.
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

2.3 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leviton Manufacturing Co., Inc.
 - b. Pass & Seymour; Legrand North America, LLC.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Pass & Seymour; Legrand North America, LLC.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leviton Manufacturing Co., Inc.
 - b. Pass & Seymour; Legrand North America, LLC.

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-15R.
4. Type: Feed through.
5. Standards: Comply with UL 498 and UL 943 Class A.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.4 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: Non-metallic
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
 5. Material to cover existing back boxes after removal of existing outlets and switches: 0. Type 302 stainless steel 0.04-inch- thick.
- C. Wall Plate Color: For plastic covers, match device color.
- D. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant , die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 3. Install wiring devices after all wall preparation, including painting, is complete.
- C. Device Installation:
 1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right .
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 FIELD TEST:

- A. Ensure that proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements of these Specifications.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:
 - a. Control circuits.
 - b. Enclosed switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Fuse size for elevator feeders and elevator disconnect switches.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Spare parts (10 % of each size and type with min. of ½ a dozen)

1.4 ELECTRICAL SYSTEM COORDINATION

- ##### A. Rating and arrangement of fuses, or overcurrent devices on service switches, which have a rating above 601 amperes, shall be selectively coordinated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Bussmann; Eaton, Electrical Sector.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
 - 1. Type RK-1: 250 600-V, zero- to 600-A rating, 200 kAIC , time delay.
 - 2. Type RK-5: 250 600-V, zero- to 600-A rating, 200 kAIC , time delay.
 - 3. Type CC: 600-V, zero- to 30-A rating, 200 kAIC .
 - 4. Type CD: 600-V, 31- to 60-A rating, 200 kAIC .
 - 5. Type J: 600-V, zero- to 600-A rating, 200 kAIC , time delay.
 - 6. Type L: 600-V, 601- to 6000-A rating, 200 kAIC , time delay.
 - 7. Type T: 250-V, zero- to 1200-A 600-V, zero- to 800-A rating, 200 kAIC .
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.
- F. All fuses shall be the product of the same manufacturer. All devices shall have the same fuse type of the same manufacturer.

2.3. SPARE FUSE CABINETS:

A. EXECUTION

a. INSTALLATION

- 1. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

b. IDENTIFICATION

- 1. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Fusible switches
3. Molded-case circuit breakers (MCCBs) type switch.
4. Enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Source quality-control reports

2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.
- E. Voltage Ratings
 - 1. 250V rating for 120V, 208V circuits.
 - 2. 600V rating for 277V and 480V circuits.
- F. Solid neutral bar when neutral conductor is included with circuit.
- G. Enclosed switches shall be lockable in "ON" position.

2.3 NONFUSIBLE/FUSABLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. Siemens Industry, Inc., Energy Management Division.
 - 3. Square D; Schneider Electric USA.
 - 4. General Electric
- B. Non-Fusible Switch: Type HD, Heavy Duty, Three Pole, Single Throw, 240 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Fusible Switch, 800 A or Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position. General Duty switches are not acceptable.

- D. Fusible Switch, 1200 A or Larger: Bolted pressure type, UL 977; operating mechanism shall utilize a rotary-mechanical bolting action to produce and maintain high clamping pressure on the switch blade after it engages stationary contacts.
- E. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

2.4 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. Siemens Industry, Inc., Energy Management Division.
 - 3. Square D; Schneider Electric USA.
 - 4. General Electric
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated 100 percent rated or series rated as indicated on the Drawings. Series rated equipment is not acceptable for this project.
- E. MCCBs shall be equipped with a device for locking in the isolated position.
- F. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below .
- G. Standards: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- I. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

J. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.5 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R) a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel).
- C. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover directly operable through the front cover of the enclosure (NEMA 250 Type 1) directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R) externally operable with the operating mechanism being an integral part of the cover (NEMA 250 Types 7, 9). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- D. Enclosures designated as NEMA 250 Type 4, 4X stainless steel shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.
- E. NEMA 250 Type 3R enclosures for outdoor location and NEMA 250, Type 4 for wet and damp locations shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1 .
 2. Outdoor Locations: NEMA 250, Type 3R .
 3. Areas: NEMA 250, Type 4X , stainless steel .
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4 .

3.2 INSTALLATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Architect no fewer than 7 days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Architect's written permission.
 - 4. Comply with NFPA 70E.
- B. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- C. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in fusible devices.
- F. Comply with NFPA 70 and NECA 1.
- G. Set field-adjustable circuit-breaker trip ranges to values indicated on the Drawings.
- H. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-6". When shown as wall mounted, switches shall be mounted to horizontal strut supports. Free standing units shall be mounted on a free-standing strut system anchored to the floor, ceiling, and walls.

3.3 FIELD TEST

- A. Test insulation resistance for each enclosed switch.
- B. Test continuity of each line- and load-side circuit.

3.4 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

END OF SECTION 262816

SECTION 262913 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manual motor controllers.
2. Enclosed full-voltage magnetic motor controllers.
3. Enclosures.
4. Accessories.
5. Identification.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of magnetic controller.

1. Include plans, elevations, sections, and mounting details.
2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
3. Wire Termination Diagrams and Schedules: Include diagrams for signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain BACnet compatible controllers of a single type through one source from a single manufacturer. Where BACnet compatible controllers are not available from the unit manufacturer, provide “gateway” to translate the unit manufacturer’s protocol to the BACnet protocol.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

C.1 MANUAL MOTOR CONTROLLERS

- A. Motor-Starting Switches (MSS): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on. Provide overload elements.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton.
 - b. Siemens Industry, Inc., Energy Management Division.
 - c. Square D; Schneider Electric USA.
 - 2. Standard: Comply with NEMA ICS 2, general purpose, Class A.
 - 3. Configuration: Nonreversing .
 - 4. Surface mounting.
 - 5. Red, Green pilot light.
 - 6. Additional Nameplates:
- B. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped. Provide overload elements
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton.
 - b. Siemens Industry, Inc., Energy Management Division.
 - c. Square D; Schneider Electric USA.
 - d. ABB

2. Configuration: Nonreversing .
3. Overload Relays: NEMA ICS 2, bimetallic class as schedule on Drawings.
4. Pilot Light: .

C.2 ENCLOSED FULL-VOLTAGE MAGNETIC MOTOR CONTROLLERS

- A. Description: Across-the-line start, electrically held, for nominal system voltage of 600-V ac and less.
- B. Provide factory-assembled combination starter and disconnect switch. Provide disconnect switch lockable in “ON” position.
- C. Provide fusible disconnecting Means if indicated in drawings: NEMA KS 1, fusible switch with rejection-type fuse clips rated for fuses
- D. Circuit-Breaker disconnecting means are acceptable subject to approval by the authority: NEMA AB 1, motor-circuit protector with field adjustable, short-circuit trip coordinated with motor locked-rotor amperes
- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. Siemens Industry, Inc., Energy Management Division.
 3. Square D; Schneider Electric USA.
 4. ABB
- F. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- G. Configuration: Nonreversing .
- H. Contactor Coils: Pressure-encapsulated type with coil transient suppressors when indicated.
 1. Operating Voltage: Manufacturer's standard, unless indicated.
- I. Control Power:
 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. Spare CPT Capacity as Indicated on Drawings: 200 VA.
- J. Overload Relays:
 1. Thermal Overload Relays:
 - a. Inverse-time-current characteristic.
 - b. Class 10 tripping characteristic.
 - c. Heaters in each phase shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - d. Ambient compensated.
 - e. Automatic resetting.

- K. Motor Control Push Button Stations and H-O-A Switches : Provide push button stations of the momentary contact type with pilot light, installed with a common faceplate. Provide “Hand-Off-Automatic” (H-O-A) switches for all starters controlling equipment with automatic actuating apparatus
- L. Digital communication module (for BMS system), using -wire connection to host devices with a compatible port to transmit the following to the LAN:
 - 1. Instantaneous rms current each phase, and 3-phase average.
 - 2. Voltage: L-L for each phase, L-L 3-phase average, L-N each phase and L-N 3-phase average - rms.
 - 3. Active Energy (kWh): 3-phase total.
 - 4. Power Factor: Each phase and 3-phase total.
(Coordinate with the building BMS system integrator.)

C.3 ENCLOSURES

- A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.
- B. The construction of the enclosures shall comply with NEMA ICS 6.

C.4 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 - 1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty, except as needed to match enclosure type. Heavy-duty or oil-tight where indicated in the controller schedule.
 - a. Push Buttons: As indicated in the controller schedule.
 - b. Pilot Lights: As indicated in the controller schedule.
- B. Motor protection relays shall be with solid-state sensing circuit and isolated output contacts for hardwired connections.
 - 1. Phase-failure.
 - 2. Phase-reversal, with bicolor LED to indicate normal and fault conditions. Automatic reset when phase reversal is corrected.
 - 3. Under/overvoltage, operate when the circuit voltage reaches a preset value, and drop out when the operating voltage drops to a level below the preset value. Include adjustable time-delay setting.

C.5 IDENTIFICATION

- A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.
- B. Arc-Flash Warning Labels:
 - 1. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis. Labels shall be machine printed, with no field-applied markings.
 - a. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
 - 1) Location designation.
 - 2) Nominal voltage.
 - 3) Flash protection boundary.
 - 4) Hazard risk category.
 - 5) Incident energy.
 - 6) Working distance.
 - 7) Engineering report number, revision number, and issue date.
 - b. Labels shall be machine printed, with no field-applied markings.

D. EXECUTION

D.1 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems" unless otherwise indicated.
- C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- E. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.
 - A. In general, roof fan motor circuit wiring is run to starters in grouped locations. Starters shall be mounted on steel framework where shown on Drawings.

Pilot light assemblies shall be installed in the covers of respective starters

D.2 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D.3 SYSTEM FUNCTION TESTS

- A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.
 - 1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 - 2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 - 3. Verify the correct operation of sensing devices, alarms, and indicating devices.
- B. Motor controller will be considered defective if it does not pass the system function tests and inspections.
- C. Prepare test per NETA ATS and inspection reports.

D.4 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain switchgear.

END OF SECTION 262913