PARKWAY SCHOOL DISTRICT

ROOFTOP HVAC REPLACEMENTS

CENTRAL HIGH & CENTRAL MIDDLE SCHOOLS

ISSUE FOR RFP
PROJECT MANUAL
26 AUGUST 2026

BID NUMBER: 27-20
Owner's Project Number: PN002601F

PREPARED BY:
Parkway Facilities Department
363 North Woods Mill Road
Chesterfield, Missouri 63017

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SECTION 001100
INVITATION TO BID

THE FACILITIES DEPARTMENT OF THE PARKWAY SCHOOL DISTRICT INVITES YOU TO BID ON THE FOLLOWING PROJECT:

1.01 PN002601F - CEH-CEM ROOFTOP HVAC REPLACEMENT UNITS AT CENTRAL MIDDLE | 471 N. WOODS MILL ROAD, CHESTERFIELD, MO 63017 AND CENTRAL HIGH | 369 N. WOODS MILL ROAD, CHESTERFIELD, MO 63017

1.02 BIDS ARE TO BE ELECTRONICALLY SUBMITTED TO:

A. Vendors must submit their responses electronically via Bonfire:

B. https://parkwayschools.bonfirehub.com/

C. Any response not received via Bonfire before the response Submission Deadline will not be considered. Each vendor is solely responsible for ensuring that their response is acknowledged and confirmed. Responses will receive a Bonfire email confirmation upon receipt.

D. All bids shall be considered valid for acceptance until such time an award is made unless the vendor provides for a different time period within its bid response. However, the District reserves the right to reject a bid if the Vendor's response is unacceptable and the Vendor is unwilling to extend the validity of its proposal.

E. The District reserves the right to purchase any quantities of bid without altering the unit purchase price upon award.

1.03 BIDS WILL BE RECEIVED ON OR BEFORE:

A. Tuesday, September 22, 2026, at 2:00 p.m. CDT

1.04 ALL BIDS WILL BE PUBLICLY OPENED ON THE AFOREMENTIONED DATE AT THE SPECIFIED TIME AND PLACE.

A. Bids may not be withdrawn for at least forty-five (45) days after the closing date for receipt of Bids.

B. All Bids must be fully completed Bids by a Prime Contractor who shall have responsibility for all portions of the Work.

C. Individual Bids by separate Contractors for separate portions of the Work will not be accepted.

1.05 THE OWNER FOR THE PROJECT IS:

A. Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017

1.06 THE OWNER'S REPRESENTATIVE FOR THE PROJECT IS:

A. Matt Furfaro
Director of Facilities
Parkway School District
363 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone: (314) 415-8289
E-mail: mfurfaro@parkwayschools.net

1.07 NOTE: BIDDERS SHALL DIRECT ALL QUESTIONS AND CLARIFICATIONS TO THE OWNER'S REPRESENTATIVE.

1.08 COPIES OF THE BIDDING DOCUMENTS MAY BE OBTAINED FROM 8:00 A.M. TO 5:00 P.M., MONDAY THROUGH FRIDAY COMMENCING ON WEDNESDAY, AUGUST 26, 2026, AT 12:00 P.M. CDT, THROUGH DOCUMENT IMAGING SYSTEMS, INC., 1463 SOUTH VANDEVENTER AVENUE, ST. LOUIS, MISSOURI, 63110 (TELEPHONE NUMBER 314-531-0167).

A. The bid package can be viewed and ordered 24/7 through their website at https://parkwayschools.bonfirehub.com/portal/?tab=openOpportunities.
   1. Cick on "Open Public Opportunities" tab at top of page.
   2. Click on "View Opportunity" for "Ref # 27-20".

B. The bid package is available for purchase and there will be no deposit or refund.

1.09 BIDDING DOCUMENTS ARE ON FILE AT:

A. Associated General Contractors of Missouri, 6330 Knox Industrial Drive, St. Louis, Missouri, 63139, www.agcmo.org

B. Dodge Construction Network, www.construction.com

C. ConstructConnect, https://projects.constructconnect.com

1.10 A MANDATORY ATTENDANCE PRE-BID CONFERENCE IS SCHEDULED FOR WEDNESDAY, SEPTEMBER 9, 2026, AT 1:00 P.M. CDT. MEET AT THE FRONT ENTRANCE TO DISTRICT OPERATIONS BUILDING

A. Directions to the pre-bid conference may be obtained by contacting the Architect.

B. Failure of the Bidder to attend the mandatory pre-bid conference will disqualify any submitted Bid from the Bidder.

1.11 A BID BOND WILL BE REQUIRED IN THE AMOUNT OF FIVE PERCENT (5%) OF THE AMOUNT OF THE BIDDER'S BID.

A. The Bid Bond must accompany the Bid in order for the Bid to be accepted.

1.12 AN EXECUTED CONTRACTOR'S QUALIFICATION STATEMENT, AIA DOCUMENT A305 INCLUDING A QUARTERLY OR ANNUAL FINANCIAL STATEMENT NOT OVER 12 MONTHS OLD MUST BE DELIVERED PRIOR TO OR WITH THE BIDDER'S BID IN ORDER FOR THE BID TO BE ACCEPTED.

A. Financial statements will be returned to the Bidder upon request received prior to the Notice To Proceed Date.

B. All financial statements not requested to be returned shall be shredded and disposed of following the Notice To Proceed Date.

1.13 IT IS ANTICIPATED THAT THE SUCCESSFUL BIDDER WILL BE GIVEN NOTICE TO PROCEED ON OCTOBER 15, 2026 WITH SUBSTANTIAL COMPLETION TO OCCUR ON OR BEFORE NOVEMBER 2, 2027.

A. The Bidder will be allowed to order equipment, materials, and supplies as necessary upon entering into the Agreement Between Owner and Contractor.

1.14 IT IS ANTICIPATED THAT THIS AGREEMENT WILL BE PRESENTED TO THE SUCCESSFUL BIDDER FOR SIGNATURE ON OCTOBER 15, 2026.

1.15 PAYMENTS WILL BE MADE BY THE OWNER WITHIN APPROXIMATELY TEN (10) BUSINESS DAYS, BUT NOT LATER THAN THIRTY (30) CALENDAR DAYS AFTER RECEIPT OF AN APPLICATION AND CERTIFICATE FOR PAYMENT WHICH RECEIVES APPROVAL.

1.16 NOT LESS THAN THE PREVAILING HOURLY RATES OF WAGES FOR WORK OF A SIMILAR CHARACTER IN THE LOCALITY IN WHICH THE WORK IS PERFORMED, ALL AS MORE FULLY SET OUT IN THE DETAILED SPECIFICATIONS FOR THIS PROJECT, SHALL BE PAID TO ALL WORKERS EMPLOYED ON SAID PROJECT.

1.17 CONTRACTOR AND SUBCONTRACTORS SHALL PROVIDE A OCCUPATIONAL SAFETY AND HEALTH (OSHA) TEN-HOUR CONSTRUCTION SAFETY AND HEALTH PROGRAM FOR THEIR ON-SITE EMPLOYEES WHICH INCLUDES A COURSE IN CONSTRUCTION SAFETY AND HEALTH APPROVED BY OSHA OR A SMILILAR PROGRAM APPROVED BY THE MISSOURI DEPATMENT OF LABOR WHICH IS AT LEAST AS STRINGENT AS AN APPROVED OSHA PROGRAM, UNLESS SUCH EMPLOYEES HAVE PREVIOUSLY COMPLETED THE REQUIRED PROGRAM.

END OF INVITATION TO BID

SECTION 002113
INSTRUCTIONS TO BIDDERS

FORM OF INSTRUCTIONS TO BIDDERS

1.01 SEE AIA DOCUMENT A701 (2018 EDITION), INSTRUCTIONS TO BIDDERS FOLLOWING THIS DOCUMENT .

END OF SECTION

AIA® Document A701® – 2018

Instructions to Bidders

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

Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

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

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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.

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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

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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.

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(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.

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§ 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 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.

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

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

(Paragraph deleted)

§ 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.

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§ 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.

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§ 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 Building Information Modeling Exhibit, if completed:

.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.)

[ ]
(Paragraphs deleted)
The Sustainability Plan:

Title	**Date**	**Pages**

[ ] Supplementary and other Conditions of the Contract:

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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.)

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SECTION 003100
AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

B. Asbestos Management Plans: Available for interiors of facilities only.
   1. Original copy is available for inspection at Owner's offices during normal business hours.
   2. Asbestos containing material location drawings excerpted from the asbestos management plans are attached following this document.
   3. All asbestos abatement required to accomplish the Work shall be performed by the Owner's asbestos abatement contractor.

C. Lead Management Plans: Available for interiors and exteriors of facilities.
   1. Original copy is available for inspection at Owner's offices during normal business hours.
   2. Lead containing material location drawings excerpted from the leadmanagement plans are attached following this document.
   3. All lead abatement required to accomplish the Work shall be performed by the Owner's lead abatement contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 004000
PROCUREMENT FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the procurement requirements.

B. Instructions to Bidders: AIA A701.

C. Substitution Request Form (During Procurement): Bidder's Discretion.

D. Bid Form: Section 004100 - Bid Form.

E. Procurement Form Supplements:
   1. Bid Security Form: AIA A310.
      a. Form AIA A310 is attached at end of Section 006000.
   2. Proposed Subcontractors Form: Section 004336 - Proposed Subcontractors Form.

F. Representations and Certifications:
   1. Bidder's Qualifications: AIA A305.
      a. Form AIA A305 is attached at end of Section 006000.

1.03 REFERENCE STANDARDS

A. AIA A305 - Contractor's Qualification Statement.

B. AIA A310 - Bid Bond.

C. AIA A701 - Instructions to Bidders; 2018.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 004100
BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

A. Parkway School District (Owner)
   1. 363 North Woods Mill Road
   2. Chesterfield Missouri 63017

1.02 FOR:

A. The project PN002601F - CEH-CEM Rooftop HVAC Replacement Units at Central Middle | 471 N. Woods Mill Road, Chesterfield, MO 63017 and Central High | 369 N. Woods Mill Road, Chesterfield, MO 63017

B. Bid Number 27-20

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER COMPANY NAME, ADDRESS, AND CONTACT INFORMATION)

A. Bidder's Full Name:
   _____

   1. Address:
      _____
   2. City, State, Zip:
      _____
   3. Telephone Number:
      _____
   4. Fax Number:
      _____
   5. E-mail Address:
      _____

1.05 ACKNOWLEDGEMENTS:

A. We acknowledge:
   1. Examination of the site and all Bidding Documents and familiarity with the conditions pertaining to the site of the work and the requirements of the Bidding Documents as they pertain to the work has been made.
   2. Responsibility for performing all the work required of the Bidding Documents.
   3. Understanding that the Owner may reserve the right to reject any or all bids and to waive any informalities in the bidding.
   4. Understanding that by submitting a bid the representations in Article 2 of the Instructions to Bidders have been made.

1.06 OFFER

A. Bidders must show bid amount in both words and figures. In case of discrepancy, amount in words shall govern.

B. Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Architect and Owner for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work. Modifications to this bid form will not be accepted. Qualifications to the scope of work for each bid package bid will not be accepted. By submitting a bid, Bidder is agreeing to perform the complete scope of work for the bid package being bid as outlined in the project documents for the Sum:

   _____
   dollars ($_____), in lawful money of the United States of America.

C. We have included the required security Bid Bond or cashier's check at 5 percent of the Bid Sum as required by the Instruction to Bidders.

D. All applicable federal taxes are included and State of Missouri taxes are included in the Bid Sum except those exempted by Missouri statutes.

1.07 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five days from the bid closing date.

B. If this bid is accepted by Owner within the time period stated above, we will:
   1. Execute the Agreement in the form available to Contractor as part of the Bidding Documents without further modifications within seven days of receipt of Notice of Award.
   2. Furnish the required bonds within seven days of receipt of Notice of Award.
   3. Commence work within three days after written Notice to Proceed of this bid.

C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure.

D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.08 CONTRACT TIME

A. If this Bid is accepted, we will:

Substantially complete the Work by January 4, 2027.

1.09 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.
   1. Addendum # _____ Dated _____.
   2. Addendum # _____ Dated _____.
   3. Addendum # _____ Dated _____.
   4. Addendum # _____ Dated _____.

1.10 BID FORM SUPPLEMENTS

A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
   1. Document 004336 - Proposed Subcontractors Form: Include the names of all Subcontractors and the portions of the Work they will perform.

1.11 BID FORM SIGNATURE(S)

A. _____

(Bidder - print the full name of your Proprietorship, Partnership, or Corporation)

B. _____

(Authorized signing officer, Title)

C. _____

D. (Typed or printed name of authorized signing officer)

1.12 IF THE BID IS A JOINT VENTURE OR PARTNERSHIP, ADD ADDITIONAL FORMS OF EXECUTION FOR EACH MEMBER OF THE JOINT VENTURE IN THE APPROPRIATE FORM OR FORMS AS ABOVE.

END OF SECTION

SECTION 004301
BID FORM SUPPLEMENTS COVER SHEET

PARTICULARS

1.01 TO (OWNER): PARKWAY SCHOOL DISTRICT

A. 363 North Woods Mill Road

B. Chesterfield, Missouri 63017

1.02 BID NUMBER _____

1.03 PROJECT NUMBER: PN002601F

1.04 PROJECT NAME: CEH-CEM ROOFTOP HVAC REPLACEMENT UNITS

1.05 PROJECT LOCATION: CENTRAL HIGH SCHOOL AND CENTRAL MIDDLE SCHOOL

1.06 DATE: _____

1.07 SUBMITTED BY: (BIDDER TO INSERT FULL COMPANY NAME AND ADDRESS)

A. _____

B. _____

C. _____

D. _____

E. In accordance with Section 002113 - Instructions to Bidders and Section 004100 - Bid Form - , we include the Supplements To Bid Form listed below. The information provided shall be considered an integral part of the Bid Form.

1.08 SUPPLEMENTS TO BID FORM

A. Section 004336 - Proposed Subcontractors Form

SIGNATURE(S)

2.01 _____

2.02 (BIDDER - PRINT THE FULL NAME OF YOUR PROPRIETORSHIP, PARTNERSHIP, OR CORPORATION)

2.03 _____

2.04 (AUTHORIZED SIGNING OFFICER, TITLE)

2.05 _____

2.06 (TYPED OR PRINTED NAME OF AUTHORIZED SIGNING OFFICER)

END OF SECTION

SECTION 004336
PROPOSED SUBCONTRACTORS FORM

PARTICULARS

1.01 HEREWITH IS THE LIST OF SUBCONTRACTORS REFERENCED IN THE BID:

A. SUBMITTED BY:

(Bidder Name)_____

B. TO (Owner): Parkway School District
   1. 363 North Woods Mill Road
   2. Chesterfield, Missouri 63017

C. dated _____ (Bidder to enter date), which is an integral part of the Bid Form.

1.02 BIDDER AGREES THAT THE FOLLOWING SUBCONTRACTORS SHALL NOT BE CHANGED WITHOUT THE WRITTEN CONSENT OF THE OWNER PRIOR TO AWARD OF THE CONTRACT.

1.03 THE FOLLOWING WORK WILL BE PERFORMED (OR PROVIDED) BY SUBCONTRACTORS AND COORDINATED BY US.

1.04 LIST OF SUBCONTRACTORS:

A. WORK SUBJECT -- SUBCONTRACTOR NAME

B. Roofing -- _____

C. Mechanical -- _____

D. Electrical -- _____

END OF SECTION

SECTION 005000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 005200 - Agreement Form for the Agreement and General Conditions.

B. The Agreement is based on AIA A101.

C. The General Conditions are based on AIA A201.

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.

B. See Section 0060000 - Project Forms for forms specifically required following.

C. Bond Forms:
   1. Bid Bond Form: AIA A310.
   2. Performance and Payment Bond Form: AIA A312.

D. Post-Award Certificates and Other Forms:
   1. Submittal Transmittal Form: Owner's electronic document management system form.
   2. Certificate of Insurance Form: ACORD Certificate of Insurance 25.
   3. Schedule of Values Form: Owner's standard form.
   4. Application for Payment Form: Owner's standard form.
   5. Sales Tax Exemption Form: State of Missouri standard form.
   6. Consent of Surety to Reduction of Retainage Form: Surety's standard form.
   7. Stored Material Form: CM/Contractor's discretion.
   8. Contractor's Daily Report Form: Owner's electronic document management system form.

E. Clarification and Modification Forms:
   1. Request for Information Form: Owner's electronic document management system form.
   2. Supplemental Instruction Form: Owner's electronic document management system form.
   3. Written Amendment Form: Owner's standard form.
   4. Proposal Worksheet Summary Form: CM/Contractor's discretion.
   5. Proposal Worksheet Detail Form: CM/Contractor's discretion
   6. Claim Request Form: Owner's electronic document management system form.
   7. Change Order Form: Owner's electronic document management system form.

F. Closeout Forms:
   1. Affidavit of Release of Liens Form: CM/Contractor's discretion
   2. Affidavit of Compliance With the Prevailing Wage Law: State of Missouri standard form.
   3. OSHA 10-Hour Construction Safety Training Log: Owner's standard form.
   4. Consent of Surety to Final Payment Form: Surety's standard form.

1.04 REFERENCE STANDARDS

A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum.

B. AIA A201 - General Conditions of the Contract for Construction.

C. AIA A305 - Contractor's Qualification Statement.

D. AIA A310 - Bid Bond.

E. AIA A312 - Performance Bond and Payment Bond.

F. AIA G714 - Construction Change Directive.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 005200
AGREEMENT FORM

PART 1 GENERAL

1.01 FORM OF AGREEMENT

A. The Agreement to be executed and Exhibits are attached at the end of this document.

1.02 RELATED DOCUMENTS

A. Document 007200 - General Conditions.

B. Section 014216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

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)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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

« »« »
« »
« »
« »

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

Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

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

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

The Owner and Contractor agree as follows.

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

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

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND 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

ARTICLE 1 THE CONTRACT DOCUMENTS

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

§ 3.1 The date of commencement of the Work shall be:

The date of this Agreement.

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

By the following date: « »

§ 3.3.2 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, 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 « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

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

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Item	Price

§ 4.2.2 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

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

Item	Price

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

Liquidated damages are established for this project as provided in Section 9.11.of the AIA Document A201™-2017, General Conditions of the Contract for Construction

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

Early completion incentives are established for this project as provided in Section 9.11.of the AIA Document A201™-2017, General Conditions of the Contract for Construction

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the ***Owner*** by the Contractor, 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:

Every two weeks on a Friday as an alternative.

§ 5.1.3 ***The Owner shall make payment within thirty (30) days after receipt of verified and approved Application for Payment.***
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 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 Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

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§ 5.1.5 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.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 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 ***Owner*** determines, in the ***Owner's*** judgment, to be reasonably justified.

§ 5.1.6.2 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 ***Owner*** has previously withheld ***approval of an Application*** for Payment as provided in Article 9 of AIA Document A201–2017;

.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 ***Owner*** may withhold payment, or nullify ***an Application for*** Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

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

Five Percent (5%)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

Insurance and Bonds

§ 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 Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

As provided in in Article 9, Section 9.3.1.3 and 9.3.1.4 of the AIA Document A201™-2017, General Conditions of the Contract for Construction

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, 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 at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

The amount of retainage established in the Certificate of Substantial Completion for the list of items to be completed or corrected prior to final payment as provided in Section 9.8.4 of the AIA Document A201-2017. If the amount of retainage established in the Certificate of Substantial Completion is greater than the retainage withheld from prior Applications for Payment, the retainage will not be released. If the amount of retainage

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established in the Certificate of Substantial Completion is less than the retainage withheld from prior Applications for Payment, the retainage will be released, but only in the amount in excess of the amount of retainage established in the Certificate of Substantial Completion.

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 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.

§ 5.2 Final Payment

§ 5.2.1 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 A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the ***Owner***.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the Owner's approval of the final Application for Payment.

§ 5.3 Interest

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.)

1.5 % Monthly

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the 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, ***non-binding dispute resolution methods*** pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

Litigation in ***accordance with requirements of Section 15.5 of AIA Document A201-2017.***

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

15% of the value of the Work not completed.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

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ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 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)

Matt Furfaro
Director of Facilities
Parkway School District
363 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8289
Email: mfurfaro@parkwayschools.net

§ 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 A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit.

§ 8.7 Other provisions:

§ 11.5.1 Indemnification
The Construction Manager shall be responsible for and shall indemnify and save harmless Owner and all of its Board, Officers, Employees and Representatives against any and all bodily injury, personal injury, and property damage due to Construction Manager's negligent acts, error, or omissions or those of Construction Manager's officers, employees, agents, or representatives in connection with Construction Manager's performance under this Agreement, and will be responsible for all costs, losses, or expenses including attorney fees arising out of such negligent acts, errors, or omissions. The Construction Manager shall require this provision in all subcontracts with Construction Manager's Subcontractors.

§ 12.8 Exclusiveness of Prescribed Remedies
No remedy herein conferred upon or reserved to Owner is intended to be exclusive of any other remedy or remedies; but each and every such remedy shall be cumulative, and shall be in addition to every other remedy given hereunder, or now hereafter existing at law or in equity or by statute. The Owner's written approval, acceptance, use, or payment for all or any part of the Architect's services hereunder or the Project itself shall in no way diminish or limit the Architect's obligations and liabilities or the Owner's rights.

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§ 12.17 Attorney's Fees
In the event the Owner files a court proceeding to enforce the terms or provisions of this Agreement or to recover damages from the Construction Manager for breach of the Agreement, the Owner shall be entitled to recover its reasonable attorneys' fees and/or legal expenses in the event the Owner is the prevailing party.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor***, as amended.***

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds***, as amended.***

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction***, as amended.***

.4 Drawings

Number	Title	Date

.5 Specifications

Section	Title	Date	Pages

.6 Addenda, if any:

Number	Date	Pages

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

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

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

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

Document	Title	Date	Pages

.8 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 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.)

Document 006000 - Project Forms Summary and attached Project Forms

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
Jeffrey Todd	« »« »
Board of Education President	
(Printed name and title)	*(Printed name and title)*

DRAFT

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AIA® Document A101® – 2017 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)

Rooftop HVAC Replacement Unit Installation at Central Middle and Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

THE OWNER:
(Name, legal status and address)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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 A201™–2017, General Conditions of the Contract for Construction.

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

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

This document is intended to be used in conjunction with AIA Document A201®–2017, General Conditions of the Contract for Construction. Article 11 of A201®–2017 contains additional insurance provisions.

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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 ***written*** 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.

§ 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 falsework 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 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 ***unless the Contractors negligent acts, omissions, or intentional misconduct resulted in the damages covered under the property insurance, in which event the Contractor shall pay any costs not covered because of such deductibles***.

§ 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

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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

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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.
(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.3.1.1.1 Certificates of Insurance shall show the additional insureds required by Section A.3.1.3. The Contractor shall provide the required policy endorsements for the additional insureds to the Owner with the certificates of insurance.

§ 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 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, 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

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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.

§ 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 ***two million dollars*** ($***2,000,000***) each occurrence, ***three million dollars*** ($***3,000,000***) general aggregate, and ***three million dollars*** ($***3,000,000***) 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.

§ 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 ***one million dollars*** ($***1,000,000***) per accident ***and two million dollars ($2,000,000) in the aggregate***, 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 ***as required by the State of Missouri***.

§ A.3.2.6 Employers' Liability with policy limits not less than ***one million dollars*** ($***1,000,000***) each accident, ***one million dollars*** ($***1,000,000***) each employee, and ***two million dollars*** ($***2,000,000***) policy limit.

§ A.3.2.7 ***Not used.***

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§ 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 ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) 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 ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) 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 ***three million dollars*** ($***3,000,000***) per claim and ***five million dollars*** ($***5,000,000***) in the aggregate.

§ A.3.2.11 ***Not used.***

§ A.3.2.12 ***Not used.***

§ 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.

§ 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.

§ A.3.3.2.3 Asbestos Abatement Liability Insurance, ***if the Work involves asbestos encapsulation or removal or both*** with policy limits of not less than ***two million dollars*** ($***2,000,000***) per claim and ***three million dollars*** ($***3,000,000***) 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.3.4 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	***The Contract Sum including adjustments by approved Change Orders***
Performance Bond	***The Contract Sum including adjustments by approved Change Orders***

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:

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§ A.4.1 Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum and in each approved Change Order.

§ A.4.2 The Contractor shall deliver the required bonds to the Owner no later than seven (7) days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ A.4.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

§ A.4.4 As set forth in 107.170 RSMo, the Contractor shall deliver with the bonds a letter that certifies the bonding company is solvent and that the representations made in the purported bonds are true and correct.

DRAFT

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SECTION 006000
PROJECT FORMS

PART 1 GENERAL

1.01 PROJECT FORMS

A. The Forms to be executed that are referenced in Section 005000 - Contracting Forms and Supplements and in the various sections of this Project Manual are attached at the end of this document.

B. The forms attached are as follows:
   1. Contractor's Qualification Statement: AIA A305
   2. Bid Bond: AIA A310
   3. Performance and Payment Bond: AIA A312
   4. Owner's Standard Schedule of Values Form
   5. Owner's Standard Application for Payment Form
   6. Substance Abuse and Safety Program Supplier/Vendor/Visitor Acknowledgement Form
   7. Refrigerant Management Contractor Information and Licensing Input Form
   8. Refrigerant Management Service Order Form
   9. Refrigerant Management Equipment Installation/Removal Form
   10. OSHA 10-Hour Construction Safety And Health Training Log Form
   11. Affidavit of Compliance With the Prevailing Wage Law
   12. Affidavit of Record Document Completion
   13. Asbestos and Lead Based Paint Notification to Contractors
   14. Notification of Asbestos and Lead Based Paint Containing Materials Contractor Acknowlegment

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

AIA® Document A305® – 2020

Contractor's Qualification Statement

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

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)

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

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

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

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

Organization's Authorized Representative Signature

Date

Printed Name and Title

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

Notary Signature

My commission expires:

ADDITIONS AND DELETIONS:
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AIA® Document A305® – 2020 Exhibit A

General Information

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

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

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

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

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

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

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

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

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

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

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

§ A.1.3 Other Information

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

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

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

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

§ A.2 EXPERIENCE

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

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

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

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

§ A.3 CAPABILITIES

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

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

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

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

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

§ A.4 REFERENCES

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

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

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

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

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AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

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

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§ B.1 FINANCIAL
§ B.1.1 Federal tax identification number:

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

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

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

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS
§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

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

.1 failed to complete work awarded to it?

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

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

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

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

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

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

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

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AIA® Document A305® – 2020 Exhibit C

Project Specific Information

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

PROJECT:
(Name and location or address.)

Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

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

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

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

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

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

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

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

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

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

§ C.2 EXPERIENCE RELATED TO THE PROJECT

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

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

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

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

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

§ C.3 SAFETY PROGRAM AND RECORD

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

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

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

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

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§ C.4 INSURANCE

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

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

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

§ C.5 SURETY

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

§ C.5.2 Surety company name:

§ C.5.3 Surety agent name and contact information:

§ C.5.4 Total bonding capacity:

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

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AIA® Document A305® – 2020 Exhibit D

Contractor's Past Project Experience

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

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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)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

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.

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

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User Notes: (1467569254)

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.

Signed and sealed this day of ,

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

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User Notes: (1467569254)

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)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

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

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

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

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

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

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User Notes: (1366702411)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

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

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User Notes: (1366702411)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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User Notes: (1366702411)

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

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

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

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

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

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

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

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

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

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

§ 14 Definitions

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

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

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

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

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

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User Notes: (1366702411)

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

§ 16 Modifications to this bond are as follows:

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

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

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User Notes: (1366702411)

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)
Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

CONSTRUCTION CONTRACT
Date:
Amount: $ 0.00
Description:
(Name and location)
Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

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

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

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:

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

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

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

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User Notes: (1350124897)

(Architect, Engineer or other party:)

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User Notes: (1350124897)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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User Notes: (1350124897)

§ 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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User Notes: (1350124897)

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

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

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

§ 18 Modifications to this bond are as follows:

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

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

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User Notes: (1350124897)

SCHEDULE OF VALUES

APPLICATION AND CERTIFICATE FOR PAYMENT is attached.

Contractor's signed Off Site Stored Products Affidavits are attached as necessary.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

Application No.:
Application Date:
Period To:
Owner's Project No.:
Owner's Purchase Order No.:

A	B	C	D	E	F	G		H	I
			Work Completed			Total Completed And Stored To Date			
Item Number	Description of Work	Scheduled Value	D + E + F From Previous Application Period	This Period	Materials Presently Stored (not in D or E)	(D + E + F)	% Completed To Date (100 X G / C)	Balance To Finish (C - G)	Retainage
						$0.00	#DIV/0	$0.00	
						$0.00	#DIV/0	$0.00	
						$0.00	#DIV/0	$0.00

APPLICATION AND CERTIFICATE FOR PAYMENT

TO: Parkway School District
Facilities Department
363 North Woods Mill Road
Chesterfield, Missouri 63017

FROM:
(Contractor)

Project:

Owner's Project No.:

Application No.:

Period To:

Owner's Purchase Order No.:

Contract Date:

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total combined Change Orders approved in previous months by Owner	$ -	$ -
Change Orders approved this period		
Number Date Approved		
	$ -	$ -
	$ -	$ -
	$ -	$ -
	$ -	$ -
CURRENT MONTH TOTALS	$ -	$ -
NET CHANGE BY CHANGE ORDERS……	$	-

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR _____

By: _____ Date: _____

Application is made for Payment, as shown below, in connection with the Contract Schedule of Values attached.

1. ORIGINAL CONTRACT SUM……	$ -
2. NET CHANGE BY CHANGE ORDERS……	$ -
3. CONTRACT SUM TO DATE (LINES 1 +/- 2)……	$ -
4. TOTAL COMPLETED AND STORED TO DATE (Column G on Schedule of Values)……	$ -
5. RETAINAGE:	
a. 0 % of Completed Work $ - (Columns D+E on Schedule of Values)	
b. 0 % of Stored Material $ - (Column F on Schedule of Values)	
c. TOTAL RETAINAGE…… (Line 5a+5b or total in column I on Schedule of Values)	$ -
6. TOTAL EARNED LESS RETAINAGE (Lines 4 less 5.c)……	$ -
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior certificate)……	$ -
8. CURRENT PAYMENT DUE (Lines 6 less 7)……	$ -
9. BALANCE TO FINISH, PLUS RETAINAGE (Lines 3 less 6)……	$ -

Stare of: _____ County of: _____

Subscribed ans sworn to before me this _____ day of _____ ,20

Notary Public: _____

My Commission Expires: _____

OWNER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Owner's Representative certifies to the Owner that to the best of the Owner's Representative's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED

AMOUNT CERTIFIED TO PAY CONTRACTOR: $ _____

OWNER'S REPRESENTATIVE:

By: _____ Date: _____

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

Substance Abuse and Safety Program
Supplier/Vendor/Visitor Acknowledgement

I,_____, acknowledge and understand that a Substance Abuse and Safety Program is in effect on this job site and that I will be expected to abide by these job site rules.

I agree not to use, possess, sell or distribute alcoholic beverages, drugs, or drug paraphernalia, drug look-alikes, firearms, weapons, explosives, ammunition, or other prohibited items on this job site. I understand that violations will result in expulsion from this job site.

I understand my involvement in an accident or other circumstances may cause the Owner, Contractor or Subcontractor to require me to have urine, blood, or saliva drug and/or alcohol test as called for in the Program. While my cooperation is voluntary, I understand that failure to cooperate will result in expulsion from this job site. This document does not supersede other job site rules, but is in addition to them.

ACKNOWLEDGEMENT AND ACCEPTANCE:

Signature _____ Date_____

Print Name _____

Company _____

Contractor Information and Licensing Input Form

Parkway School District Refrigerant Management System

This form must be completed for each project performed by the Contractor and returned to Parkway School District. Enter the information requested in the boxes below. Complete all boxes. Enter "N/A" if the information requested is not applicable.

Company:			
Address 1:			
Address 2:			
Contact:			
Phone No.:		**Fax No.:**	
Owner's Project No.:			
Owner's Project Title:			
Project Start Date:		**Project Stop Date:**	

Enter the refrigerant technician certification information for each technician that will work on this project. Attach a copy of each technician's certificate.

Technician's Full Name	Certification Level	Certification Number

Ser□ice Order □orm

Ser□ice ID□	**O□ner□**
□ or□ Order □□	**□acilit□□**
Date□Issued□ **Completed□**	**□ppliance ID□**
Technicians□	**Location□** **Model□**
	Manu□act□ **Serial □□**
	Re□rigerant T□pe□ **Charge□** **l□s** **o□**

Ser□ice Re□uest

Ser□ice Description

☐ Confirm Charge ☐ Upgrades Installed ☐ Minor Maintenance Vacuum: _____

☐ Dispose of Unit ☐ Refrigerant Conversion ☐ Major Maintenance inches ☐ microns ☐

Re□rigerant	C□linder ID	T□pe	Condition	□uantit□
Reco□ered				**L□s** **o□**
				L□s **o□**
				L□s **o□**
	Reco□er□ □nit ID □ □□□□□□□			
□dded				**L□s** **o□**
				L□s **o□**
				L□s **o□**
	☐ **Startup Charge**		**□et Re□rigerant □dded□**	**L□s** **o□**

Parts □sed

Parts □o	Description	□uantit□

Material □otes

Total Hours on this Service: _____

Lea□s

☐ Leak Found Date: _____

☐ Leak Repaired Date: _____

☐ Initial Leak Test Method: _____

☐ Follow-up Test Method: _____

☐ AQMD Leak Audit Date: _____

Leak Notes:

Trace Gas Used _____ Cylinder ID _____ Quantity _____ Lbs _____ oz

☐ Accidental Release Occurred

Description:

Estimated Amount Released _____ lbs _____oz

Oil Removed _____ gallons Type of Oil _____

Accumulation Drum # oil put In _____

□□uipment Installation□Remo□al Input □orm

Par□□a□ School District Re□rigerant Management S□stem

Complete this form and return it to Parkway School District for each piece of equipment containing refrigerant that is removed or installed. Enter <u>all</u> the information requested in the form below. ***Complete page 1 for removal and complete page 1 and 2 for installation. Double outlined boxes are check boxes.***

R□MO□□L		Remo□al Date		I□ST□LL□TIO□		Installation Date	
□our Compan□ □ame				**□nit □ield Tag □um□er**			
Technician□s □ame				**□nit Manu□acturer**			
□uilding □ame				**□nit Model □um□er**			
O□ner□s Pro□ect □o				**□nit Serial □um□er**			
O□ner□s Pro□ect □ame							
General Location□	Classroom		Mechanical Room		Rooftop		Site
Detailed □□uipment Location □Room □o□, Roo□□rea □o□, □tc□□							
□P□ □ppro□ed Method □sed to Determine Charge□			Measurement (Weight)		Manufacturer's Data		
Re□rigerant Reco□ered □rom □□uipment				Yes		No	
□□uipment Tagged "Re□rigerant Reco□ered"				Yes		No	
Re□rigerant Charge □See □elo□ □□		**Re□rigerant T□pe**					

Compressor 1		Lbs.		Ozs.	Compressor 2		Lbs.		Ozs.
Compressor 3		Lbs.		Ozs.	Compressor 4		Lbs.		Ozs.

□ppliance T□pe □chec□ one □elo□ □			
	□ir Handling □nit□Cooling		**□ree□er □ □ al□in**
	Chiller □Centri□ugal		**Heat Pump**
	Chiller □Reciprocating		**Ice Machine**
	Chiller □Scre□		**Re□rigerated □ir Dr□er**
	Condensing □nit□□nit □entilator		**Re□rigerator**
	□dpac □nit □Mc□el□e□□		**Roo□Top □nit**
	□lectric □ ater Cooler		**Sel□Contained □nit □entilator**
	□ood Case		**□ al□in cooler**
	□ree□er		**□ indo□ □nit**
	□ree□er □Stand □p		**Other □descri□e in notes □elo□ □**

□otes□

□e□ □□uipment Data □complete □elo□ □or ne□ installations□												
Dut□T□pe□	Comfort		Under 50 Lbs.		Other Refrigeration							
Capacit□ □uantit□		**Capacit□ □nits□**	BTUH		Tons							
Lu□ricant		**□nit □oltage□Phase□Hert□**										
Comp□□ M□r□												
Serial □um□er		**Model □o□**										
Pressure□	Head		Suction		**□mps□**	L1		L2		L3		
Comp□□ M□r□												
Serial □um□er		**Model □o□**										
Pressure□	Head		Suction		**□mps□**	L1		L2		L3		
Comp□□ M□r□												
Serial □um□er		**Model □o□**										
Pressure□	Head		Suction		**□mps□**	L1		L2		L3		
Comp□□ M□r□												
Serial □um□er		**Model □o□**										
Pressure□	Head		Suction		**□mps□**	L1		L2		L3		
Suppl□ □an M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							
Return □an M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							
Cond□□an □M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							
Cond□□an □M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							
Cond□□an □M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							
Cond□□an □M□r□												
Serial □um□er		**Model □o□**										
□mps□	L1		L2		L3							

SECURITY BADGE & OSHA 10 HOUR CONSTRUCTION SAFETY & HEALTH TRAINING LOG

Parkway Project Number _____

The undersigned certify that they have obtained a security badge from the Owner's security office and that they have successfully completed the OSHA 10 Hour Safety Training program pursuant to Section 292.675 RSMo and understand that they shall carry the issued security badge and documentation of successful completion of the OSHA 10 Hour Safety Training program at all times while working on the Project site.

Print Name	Signature	First Date On Site	Company	Owner's Security Badge Number	OSHA 10 Hour Training Certification Number

DIVISION OF LABOR STANDARDS

MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

AFFIDAVIT
COMPLIANCE WITH THE PREVAILING WAGE LAW

I, _____, upon being duly sworn upon my oath state that: (1) I am the
(Name)

_____ of _____; (2) all requirements of
(Title) *(Name of Company)*

§§ 290.210 to 290.340, RSMo, pertaining to the payment of wages to workers employed on public works projects have been fully satisfied with regard to this company's work on _____;
(Name of Project)

(3) I have reviewed and am familiar with the prevailing wage rules in 8 CSR 30-3.010 to 8 CSR 30-3.060; (4) based upon my knowledge of these rules, including the occupational titles set out in 8 CSR 30-3.060, I have completed full and accurate records clearly indicating (a) the names, occupations, and crafts of every worker employed by this company in connection with this project together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed, (b) the payroll deductions that have been made for each worker, and (c) the amounts paid to provide fringe benefits, if any, for each worker; (5) the amounts paid to provide fringe benefits, if any, were irrevocably made to a fund, plan, or program on behalf of the workers; (6) these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available, as often as may be necessary, to such body and the Missouri Department of Labor and Industrial Relations; (7) such records shall not be destroyed or removed from the state for one year following the completion of this company's work on this project; and (8) there has been no exception to the full and complete compliance with the provisions and requirements of Annual Wage Order No. _____ Section _____ issued by the Missouri Division of Labor Standards and applicable to this project located in _____ County, Missouri, and completed on the ____ day of _____, _____.

The matters stated herein are true to the best of my information, knowledge, and belief. I acknowledge that the falsification of any information set out above may subject me to criminal prosecution pursuant to §§290.340, 570.090, 575.040, 575.050, or 575.060, RSMo.

_____
Signature

Subscribed and sworn to me this ____ day of _____, _____.

My commission expires _____, _____.

_____
Notary Public

_____
Receipt by Authorized Public Representative

Missouri Department of Labor and Industrial Relations is an equal opportunity employer/program.

AFFIDAVIT
RECORD DOCUMENT COMPLETION

Before me, the undersigned Notary Public, in and for the County of _____, in the State of _____, personally came and appeared (Name), _____-(Title)_____ of the (Name of Company)_____ (a corporation)(a partnership)(a proprietorship) and after being duly sworn did depose and say that the Record (Drawings)(Specifications) have been marked-up in the Owner's electronic document management system with all known as-constructed variations from the Bid Documents, with the exception of those variations officially issued in the form of sketches, drawings, or specification changes by the Architect and Owner through Supplemental Instructions, Change Directives, or Change Orders, which variations have been completed by the Architect in the performance of their contractual services to the Owner, as required in the Specifications for the Project known as:

(Owner's Project Number)_____

(Project Title)_____

(Project Facility Name)_____

Signature: _____ Date: _____

Subscribed and sworn to me this _____ day of _____ , _____

My commission expires _____ , _____

Notary seal and signature:

ASBESTOS AND LEAD BASED PAINT
NOTIFICATION TO CONTRACTORS
At
Parkway School District
Building: *#*, *Name of Building/School*
Address of Building/School
Address of Building
Date

Contact Name
Name of Contractor
Address
Address

Dear *Contact Name*:

As a contractor for the Parkway School District (PSD), your employees and subcontractors have access to and will be working in the PSD building (*School Name*) All PSD buildings, except for Early Childhood North, Southwest Middle and Oakbrook Elementary contain some amount of asbestos containing building materials. All Parkway School District Buildings built in or previous to 1978 were tested for the presence of lead based paint. In compliance with U.S. Environmental Protection Agency asbestos notification requirements (40 CFR 763.84), and the Lead Renovation Repair and Painting Rule (40 CFR 745) the PSD is submitting this notification package to *Name of Contractor*. Attached is the *Name of Building/School* asbestos and lead based paint information package for you to review with your employees and subcontractors prior to beginning work in *Name of Building/School*. The asbestos materials identified in this notification are for interior building materials only. Exterior and inaccessible building materials may not have been sampled or identified as asbestos or lead containing. Should exterior or hidden suspect building materials be encountered, work in this area should not begin until additional sampling and materials identification is performed by PSD. This package includes asbestos and lead based paint summary sheet(s) for *Name of Building/School* and the Contractor Notification Signature Sheet that must be signed by all *Name of Contractor* personnel and subcontractor personnel that will be working at *Name of Building/School*. Each employee must sign the signature sheet to be able to conduct work in the buildings. Employees are required to sign signature sheet only one time.

Asbestos & Lead Based Paint Notification
Name of Contractor
Name of Building/School
Date

Asbestos and lead based paint materials denoted on the asbestos and lead based paint summaries are not to be disturbed. Only Certified Lead Renovators can perform work with lead based paint using approved renovation, repair and painting practices. If your employees should discover any disturbed asbestos containing materials or lead based paint; or if they disturb these materials while they are in the building; all work must stop and *Name of Contractor* must notify me (573-201-5067) immediately. Additional notification must be made to the district construction supervisor or maintenance supervisor that manages the project. If your employees discover a material that they are unsure of its asbestos or lead based paint content, they must not disturb it without authorization form PSD.

Original signed signature sheets must be submitted to the District Construction Supervisor on a weekly basis. Copies of the signature sheet may be made as needed for each successive week. A copy of the signature sheet and the asbestos and lead based paint material summaries must be available on site during any work within a specific building so that *Name of Contractor* employees, subcontractor employees, and PSD can review them at any time. PSD reserves the right to review these documents when *Name of Contractor* employees or subcontractors are working in a building. If these documents are not available, or *Name of Contractor* personnel working in the building have not signed the signature sheet, PSD can stop work until the required documents and signatures are available. If you have any questions concerning the asbestos and lead based paint summary sheets or the contractor notification signature sheets that we have included in this package please call me at 314-415-8260.

Stephanie Kline-Tissi, ASP
Safety Manager, District Operations
Parkway School District
Phone: 314-415-8260
24-Hour Emergency Number: 314-415-8200

CONTRACTOR NOTIFICATION OF ASBESTOS AND LEAD BASED PAINT CONTAINING BUILDING MATERIALS

Retain Copy in Asbestos Files

Month Ending Date: _____

Company Name: _____*Name of Contractor*_____.

Parkway Building: _____*Name of Building/School*_____

Name & Title of
Company Representative: _____*Name of Contact*_____

Type of Work to be Performed: *Type of Work to be Performed* Bid No. *Project #*

I have reviewed the Asbestos information for *Name of Building/School* and have been advised of the types and locations of asbestos materials that I may potentially come into contact with while performing my work. I have been given the opportunity to review the Asbestos Management Plan for this facility, if requested. I will perform my work without disturbing the asbestos containing materials or will inform the Construction Supervisor and the Asbestos Program Manager if unable to do so. In such case, the Asbestos Program Manager will give instructions as required prior to any work that may potentially disturb asbestos-containing materials. If asbestos-containing materials are inadvertently disturbed or if disturbed materials are discovered, work will cease immediately, and the Construction Supervisor and Safety Manager, Stephanie Kline-Tissi (573-201-5067) will be contacted. The Construction or Maintenance Supervisor managing the project will also be contacted if the Parkway supervisor is not available.

COMPANY NAME	**PRINTED NAME & SIGNATURE**	**DATE**
_____	_____	_____
	_____	
_____	_____	_____
	_____	

Asbestos & Lead Based Paint Notification
Name of Contractor
Name of Building/School
Date

COMPANY NAME	PRINTED NAME & SIGNATURE	DATE

SECTION 007200
GENERAL CONDITIONS

PART 1 GENERAL

1.01 FORM OF GENERAL CONDITIONS

A. The General Conditions applicable to this contract is attached at the end of this document.

1.02 RELATED DOCUMENTS

A. Document 005200 - Agreement Form.

B. Section 014216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Rooftop HVAC Replacement Units Installation at Central Middle & Central High Schools

Central Middle School
471 North Woods Mill Road
Chesterfield, Missouri 63017

Central High School
369 North Woods Mill Road
Chesterfield, Missouri 63017

Bid No. 27-20

THE OWNER:
(Name, legal status and address)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

THE ARCHITECT:
(Name, legal status and address)

Parkway School District
455 North Woods Mill Road
Chesterfield, Missouri 63017
Telephone Number: 314-415-8100

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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.5 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.

§ 1.1.6 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.

§ 1.1.7 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***,*** the Architect's consultants***, and any other design professionals retained by the Owner for the Project*** under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 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 ***and certify termination of the Agreement under Section 14.2.2.***

§ 1.1.9 Hazardous Materials

Hazardous Materials are those materials or substances regulated as a hazardous substance, hazardous material, toxin, pollutant, or hazardous waste under applicable federal, state, or local laws, ordinances, rules, or regulations governing the protection of human health or the environment.

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§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect**,** the Architect's consultants***, and any other design professionals retained by the Owner for the Project*** 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 ***certified or registered*** mail, by courier ***providing proof of delivery***, 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 ***electronic transmission to the centralized electronic document management system***.

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§ 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 otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Not used.**§ 2.2.2** Not used.**§ 2.2.3** Not used.**§ 2.2.4** Not used.

(Paragraphs deleted)

§ 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.

§ 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 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site ***upon Contractor's written request for such information***. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but ***only after the Contractor diligently reviews such surveys and notifies the Owner of any discrepancies or problems observed by the Contractor. The Contractor*** shall exercise proper precautions relating to the safe performance of the Work ***when relying upon Owner supplied surveys***.

§ 2.3.5 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 ***reasonably necessary which are*** 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.

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§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish ***free of charge*** to the Contractor ***up to twenty (20) copies*** of the Contract Documents. ***Additional copies will be furnished upon request by the Contractor at the cost of reproduction, postage, and handling.***

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is ***defective or otherwise*** 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 ***or fails to supply sufficient skilled labor, suitable materials, or appropriate equipment***, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior ***written*** approval of the Architect. ***In such case, an appropriate Change Order shall be issued*** to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's 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 ***lawfully licensed or registered as a Contractor in St. Louis County, Missouri and the State of Missouri and*** identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The 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 Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, 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 Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the 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.

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§ 3.2.2.1 In all cases where the Work abuts or interconnects with existing or other work, Contractor shall verify at the site all grades, elevations, locations, or dimensions relating to such existing or other work. Any errors in the Work due to Contractor's failure to verify all such grades, elevations, locations, or dimensions shall be promptly rectified at Contractor's sole cost, without any additional cost to the Owner.

§ 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 Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

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

§ 3.3 Supervision and Construction Procedures

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

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§ 3.5 Warranty

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

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

§ 3.6.2 As set forth in 144.030RSMo and 144.062RSMo, Contractors who purchase materials and/or supplies for the purpose of construction, repairing, or remodeling facilities for the Owner are exempt from paying sales tax on those materials and/or supplies. The official state tax exemption certificate will be furnished to the Contractor by the Owner.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 ***The Owner shall secure and pay the building permit from St. Louis County, Missouri or the local municipality, whichever has jurisdiction, the building permit from the local Fire District, and the permit and connection fees required by the Metropolitan St. Louis Sewer District, as applicable. The Contractor will be required to pick up the permits from the government agencies. The Contractor will be reimbursed by the Owner for the actual direct cost of these permits without any additional costs except for a reasonable amount of project management time required to pick up the permits. The*** Contractor shall secure and pay for ***any*** other permits, fees, licenses, and inspections by government agencies necessary for proper execution, completion***, and occupancy*** of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (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 and the Architect before conditions are disturbed and in no event later than ***7*** days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect 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. ***The Contractor's failure to advise the Owner and the Architect of such concealed conditions within 7 days of discovery by the Contractor or any party claiming under the Contractor shall preclude the Contractor's right to seek costs related to such conditions.*** If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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§ 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 and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the ***Owner*** may notify the Contractor, stating whether the Owner (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the ***Owner*** 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 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 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.

§ 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 ***Owner's*** approval. The ***Owner'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 Architect ***and the Owner*** 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.

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§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 Whenever it becomes apparent from the latest schedule or otherwise that any completion date on the original schedule, subject to adjustment as provided under the Contract Documents, may not be met, the Contractor shall take some or all of the following actions at no additional cost to the Owner to put the Project back on schedule: (1) increase construction manpower in such quantities as will eliminate the backlog of work; (2) increase the number of working hours per shift, shifts per working day, working days per week, or the amount of construction equipment, or a combination of the aforesaid, which will substantially eliminate the backlog of work; (3) reschedule activities to achieve maximum practical accomplishment of activities. If the Contractor fails to take any of the above within seventy-two (72) hours after receiving written notice from the Owner or Architect of the slip in schedule, the Owner may, but shall not be obligated, to take action to attempt to put the Project back on the original schedule, subject to the adjustments permitted hereunder, and deduct the cost of such actions from the Contract Sum.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect 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, ***illustrations,*** 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 the Owner*** is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect ***and the Owner 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 Architect ***and the Owner*** without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect ***and the Owner***, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the ***Owner*** or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner 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 approved by the Architect ***and the Owner***.

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§ 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 ***and the Owner's*** approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect ***and the Owner*** of such deviation at the time of submittal and (1) the Architect ***and the Owner have*** 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 ***and the Owner'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 Architect ***and the Owner*** on previous submittals. In the absence of such notice, the Architect's ***and the Owner'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. ***Such design professionals shall obtain and maintain through their provisions of Work under this Agreement, professional errors and omissions liability insurance in the amount of two million dollars ($2,000,000) per claim and three million dollars ($3,000,000) in the aggregate.*** Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect ***and the Owner*** will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

The Contractor shall confine operations ***and the storage of materials and equipment*** 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.

§ 3.14 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 or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The

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Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall ***continuously*** 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 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 and Architect with access to the Work in preparation and progress wherever located. ***Other representatives of the Owner, such as testing agencies and governmental agencies shall have access to the project at reasonable times for their observation, inspection, and testing. The Contractor will provide proper and safe conditions for such access.***

§ 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 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 or Architect. 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.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify***, defend with legal counsel acceptable to the Owner,*** and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to ***personal injury,*** bodily injury, sickness, disease or death, ***the Contractor's failure to make payment to any subcontractor or supplier in connection with the Work,*** or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

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

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§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the ***Owner approves*** the final ***Application*** for Payment. The 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. The 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.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall ***endeavor to*** include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. ***If the Owner is unable to include the Architect in a communication with the Contractor, the*** Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor ***relating to the Architect's services or professional responsibilities or*** otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect ***unless the Architect authorizes direct communication with the Architect's consultants. If authorized by the Architect, the Owner or Contractor shall promptly notify the Architect of the substance of any direct communications between the Owner or Contractor and the Architect's consultants***. Communications by and with Subcontractors and suppliers shall be through the Contractor ***unless the Contractor authorizes direct communication with the Contractor's Subcontractors and suppliers. If authorized by the Contractor, the Owner or Architect shall promptly notify the Contractor of the substance of any direct communications between the Owner or Architect and the Contractor's Subcontractors and suppliers***. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Not used***.***

§ 4.2.6 The Architect***, in consultation with the Owner,*** has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect***, in consultation with the Owner,*** will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 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 ***Owner*** 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. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety

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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.

§ 4.2.8 The Architect will ***assist the Owner in preparing*** Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 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 Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

§ 4.2.12 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 rendered in good faith.

§ 4.2.13 The Architect's decisions***, made with the concurrence of the Owner,*** on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests 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 a Separate Contractor or the subcontractors of a Separate Contractor.

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner 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 ***Owner*** may notify the Contractor whether the Owner (1) has objection to any such proposed person or entity or (2) requires additional time for review. Failure of the ***Owner*** to provide notice within the 14-day period shall constitute notice of no objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner has made 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 or Architect has objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner has no objection. If the proposed but rejected Subcontractor was reasonably

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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 change the initial list of Subcontractors approved by the Owner without written approval.*** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner makes objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner 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. ***Subcontractors shall be required, unless otherwise agreed to in writing by the Owner, to carry the same types and amounts of insurance as the Contractor, and shall name the Owner, Architect, and Architect's consultants as additional insured with respect to the Project.*** 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 and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. 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.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

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§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each ***Owner's*** Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, ***the Owner's*** Separate Contractors, and the Owner until subsequently revised ***and agreed to by the Owner***.

§ 6.1.4 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 and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify ***the Owner and*** the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify 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 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 Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor 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 a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

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

§ 6.2.5 The Owner and each Separate Contractor 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, 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 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, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner 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.

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§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the ***Owner*** and ***approved*** by the Owner, 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.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the ***Owner or*** Architect ***or both*** and ***approved*** by the Owner***, Contractor,*** 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 Architect 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 Architect 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 Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

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

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

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with ***preparing a proposal for*** the change in the Work involved and advise the ***Owner*** 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.

§ 7.3.6.1 The Contractor shall promptly proceed with the change in the Work described in the Construction Change Directive only if the Contractor is explicitly directed to proceed in the Construction Change Directive.

§ 7.3.6.2 If the Construction Change Directive does not contain an explicit direction to proceed, the Contractor shall promptly proceed with the change in the Work only upon receipt of a Change Order that references the Construction Change Directive.

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§ 7.3.7 A Construction Change Directive ***approved*** 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 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 ***Owner*** will make an interim determination for those costs that the ***Owner*** determines to be reasonably justified. The ***Owner's*** 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***, Architect,*** and Contractor agree 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 ***Owner*** will 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***, in consultation with the Owner*** 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 Architect ***and the Owner*** 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 Architect 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 or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented

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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 determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

§ 9.1.2 Not used.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the ***Owner*** 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 ***Owner***. This schedule, unless objected to by the ***Owner***, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the ***Owner*** and supported by such data to substantiate its accuracy as the ***Owner*** may require, and unless objected to by the ***Owner***, 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 ten days before the date established for each progress payment, the Contractor shall submit to the ***Owner*** 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 ***may*** require, such as copies of requisitions, and releases and waivers of liens 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 ***Owner***, 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.

§ 9.3.1.3 The Owner will not withhold retainage on account of progress payment provided the Contractor shall have met identified target dates in the Contractor's CPM network analysis schedule for the Project.

§ 9.3.1.4 The Owner reserves the right to withhold retainage on account of progress payments in the amount not to exceed five percent (5%) of the total completed and stored to date amount as identified in the Application for Payment if the Contractor has not met identified target dates in the Contractor's CPM network analysis schedule for the Project.

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

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§ 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 The ***Owner*** will, within seven days after receipt of the Contractor's Application for Payment, either ***approve the Application for Payment*** or withhold ***the*** Application for Payment, and notify the Contractor of the ***Owner's*** reason for withholding certification in whole ***or in part*** as provided in Section 9.5.1.

§ 9.4.2 ***Not used.***

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The ***Owner*** may withhold ***an Application*** for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the ***Owner's*** opinion the ***Work has not progressed to the point indicated or quality of the Work is not in accordance with the Contract Documents***. If the ***Owner*** is unable to ***approve*** payment in the amount of the Application ***for Payment***, the ***Owner*** will notify the Contractor as provided in Section 9.4.1. If the Contractor and ***Owner*** cannot agree on a revised amount, the ***Owner*** will promptly issue ***an Application*** for Payment for the amount for which the ***Owner*** is able to ***approve***. The ***Owner*** may also withhold ***an Application*** for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of ***an Application*** for Payment previously issued, to such extent as may be necessary in the ***Owner's*** opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from 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;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When ***the Contractor*** disputes the ***Owner's*** decision regarding ***an Application*** for Payment under Section 9.5.1, in whole or in part, ***the Contractor*** may submit a Claim in accordance with Article 15.

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

§ 9.5.4 If the ***Owner*** withholds ***an Application*** for ***Payment*** under Section 9.5.1.3, 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 Contractor ***and the Contractor*** shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 ***The*** Owner shall make payment ***on an approved Application for Payment*** in the manner and within the time provided in the Contract Documents.

§ 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.

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§ 9.6.3 The ***Owner*** 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 Architect and Owner 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 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 ***An Application for*** Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

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

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend**,** indemnify***, and hold harmless*** the Owner ***as provided in Section 3.18 for*** any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the ***Owner*** does not ***approve an Application*** for Payment, through no fault of the Contractor, within seven days after 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 ***approved*** by the ***Owner*** or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner ***and the Owner's failure to cure such a delinquent payment within the seven (7) day period***, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

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

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall 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 list, the Architect ***and the Owner*** will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's ***and the Owner's*** inspection discloses any item, whether or not included on the Contractor's 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 to determine Substantial Completion.

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§ 9.8.3.1 If the Architect's and the Owner's inspection discloses and item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents, but does not preclude the Owner from occupying or utilizing the Work or designated portion thereof for its intended use, then the Architect shall append the items to the list prepared by the Contractor. The appended list of items to be completed or corrected prior to final payment shall be attached to the Certificate of Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the ***Owner*** will prepare 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 ***and fix the value of the amount of retainage to be withheld until the Contractor shall finish all items*** on the list ***of items to be completed or corrected prior to final payment*** 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.

§ 9.8.4.1 Warranties required by the Contract Documents shall commence on the date of acceptance by the Architect and the Owner for any items on the list of items to be completed or corrected prior to final payment.

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall 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.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the 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 receipt of the Contractor's notice that the Work is ready for final inspection and acceptance, the ***Owner*** will promptly make such inspection. When the ***Owner*** finds the Work acceptable under the Contract Documents and the Contract fully performed, the ***Owner*** will promptly ***approve the*** final ***Application*** for Payment ***upon receipt. If the Owner does not find the Work acceptable or completed, the Owner shall notify the Contractor of the details in which the inspections reveal that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to complete the Work or remedy the incomplete or defective Work.***

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the ***Owner*** (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'

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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 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 Architect so confirms, the Owner shall, upon application by the Contractor, 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 ***Owner*** 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.

§ 9.11 Liquidated Damages and Incentives

§ 9.11.1 Because the Owner has scheduled use of the completed project, time is an essential and material factor of this Agreement. Failure to complete the work on or before the date of Substantial Completion will subject the Owner to loss and damage. Since the measure of such loss or damage is not readily ascertainable, it is hereby established that the loss according to the Owner from any failure on the part of the Contractor to date shall be liquidated and fixed at sum of $N/A per calendar day or portion of day that the work remains incomplete past the date of Substantial Completion in accordance with the terms of this Agreement.

§ 9.11.2 The Owner shall reward the Contractor for early completion of the project before the date of Substantial Completion at the sum of $N/A per calendar day up to a sum that shall not exceed $N/A.

§ 9.11.3 The Contractor agrees that this is a reasonable amount for liquidated damages due to delays and is not a penalty. Owner may deduct this sum from any sum that may be due to the Contractor.

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.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable ***and necessary*** 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; and
- **.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.

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§ 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.

§ 10.2.4.1 When use or storage of explosives, hazardous materials, equipment, or unusual methods are necessary, the Contractor shall give the Owner advance notice and shall receive written approval from the Owner for such use or storage.

§ 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 and 10.2.1.3 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 and 10.2.1.3. 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 or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. 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 and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

§ 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 and Architect of the condition.

§ 10.3.1.1 The Owner will notify the Contractor prior to beginning the Work of the location for known asbestos containing materials and lead containing materials within the limits of the Work. The Contractor shall be required to notify all of the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with asbestos containing materials and lead containing materials within the limits of the Work. Information presented to the Contractor by the Owner identifying the location for all known asbestos containing materials and lead containing materials within the limits of the Work shall be displayed prominently at the work site for all workers to review.

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§ 10.3.1.2 Prior to being allowed on the work site, the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with the asbestos containing materials and lead containing materials shall be required to sign an acknowledgement form indicating that they have been informed of the presence and location for all known asbestos containing materials and lead containing materials and that the known asbestos containing materials and lead containing materials shall not be disturbed in any manner.

§ 10.3.1.3 The Contractor shall indemnify and hold harmless the Owner for any disturbance of the disclosed known asbestos containing materials and lead containing materials by the Contractor's employees, Subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable that may come in contact with the asbestos containing and lead containing materials under the Contractor's obligations in Section 3.18. Failure to fulfill the Contractor's requirements under Section 10.3.1.2 shall not relieve the Contractor of obligations under this Section10.3.1.3 or Section 3.18

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor 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 and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor 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, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work 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.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

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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, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner 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 the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor 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 ***There are no waivers of subrogation.***

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§ 11.3.2 Not used.

§ 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.

§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 Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the 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 Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's 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 Architect has not specifically requested to examine prior to its being covered, the 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 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 Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails***, after discovery of the condition*** 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. ***The waiver of the rights by the Owner to require correction of non-conforming work and make a claim for breach of warranty by the Contractor is not***

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applicable to non-conforming work discovered after the one year period, but within statutory limitation period provided by law. If the Contractor fails to ***commence and continue correction of such*** nonconforming Work ***with diligence and promptness*** within ***the ten-day period*** after receipt of notice from the Owner 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 ***A new*** one-year period for correction of Work shall ***exist for all corrective work performed by the Contractor pursuant to this Section 12.2, but such a new one-year period shall apply only to the specific item, component, or system corrected.***

§ 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 or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 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 state of Missouri.

§ 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, 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

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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 ***Owner and*** Architect timely notice of when and where tests and inspections are to be made so that the ***Owner 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 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 ***Owner*** will, upon written authorization, 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 ***Owner and*** Architect of when and where tests and inspections are to be made so that the ***Owner 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 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 ***Owner and*** Architect.

§ 13.4.5 If the ***Owner and*** Architect ***are*** to observe tests, inspections, or approvals required by the Contract Documents, the ***Owner and*** Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing ***governed by the law of the state of Missouri.***.

§ 13.6 Equal Opportunity

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

§ 13.6.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to: employment, promotions, demotions, transfers, recruitment, recruitment advertising, layoffs, terminations, rates of pay or compensation, and selection of training, including apprenticeships. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

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

§ 13.7 Domestic Products Procurement

§ 13.7.1 The Owner encourages Contractors and Subcontractors to purchase or lease products manufactured, assembled, or produced in the United States when providing goods and services to the Owner.

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§ 13.7.2 As set forth in 171.181 RSMo, the Owner will give preference to commodities manufactured, mined, produced, or grown within the state of Missouri and will give preference to all firms, corporations, or individuals doing business as Missouri firms, corporations, or individuals when quality and price are approximately the same.

§ 13.8 Americans with Disabilities Act

§ 13.8.1 The Owner is bound by and complies with the Americans with Disabilities Act (ADA). The Owner has designated the following individual to oversee the ADA requirements for the Owner: John Blanton, Manager of Planning and Construction Services, 314-415-8289.

§ 13.9 Alternative Dispute Resolution

§ 13.9.1 Alternative Dispute Resolution (ADR) methodologies will be encouraged in place of more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship between parties. ADR is to be a voluntary, non-binding procedure available for use by the parties to this Contract to resolve any dispute that may arise during performance of the Work.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for ***authorized*** Work ***properly*** executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 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 or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, 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

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Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the 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 be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

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§ 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 ***time period specified by the laws of the state of Missouri.***

§ 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 Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

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

§ 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. ***The Contractor shall make allowance in the Contract Time and schedule for 10 adverse weather condition days. Claims for additional costs or time extensions due to adverse weather conditions will not be entertained until after these 10 adverse weather condition days have been claimed and resolved according to Section 15.2***

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including 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 excludes

.1 damages incurred by the Owner or Contractor as the result of either party's gross negligence or willful misconduct, and

.2 damages incurred by the Owner or Contractor covered by insurance in accordance with requirements as outlined in Article 11.

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This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to ***litigation*** 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 binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to binding dispute resolution.

§ 15.2.6 Not used.

§ 15.2.6.1 Not used.

§ 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 ***Binding mediation will not be allowed under this Contract as a method to resolve any claim, dispute or other matter in question arising out of or related to this Contract.*** 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 ***non-binding alternative dispute resolution methods or by*** binding dispute resolution.**§ 15.3.2** The parties shall endeavor to resolve their Claims, ***disputes, or other matter in question arising out of or related to the Contract*** by ***non-binding alternative dispute resolution methods.*** A request for ***non-binding alternative dispute***

Init.
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resolution methods shall be made in writing, delivered to the other party to the Contract. The request may be made concurrently with the filing of binding dispute resolution proceedings.

(Paragraph deleted)
§ 15.3.3 ***Not used.***

§ 15.3.4 ***Not used.***
§ 15.4 Arbitration
§ 15.4.1 ***Arbitration will not be allowed under this Contract as a method to resolve any Claim, dispute or other matter in question arising out of or related to this Contract.***

§ 15.4.1.1 ***Not used.***

§ 15.4.2 ***Not used.***

§ 15.4.3 ***Not used.***

§ 15.4.4 ***Not Used***
§ 15.4.4.1 ***Not used.***

§ 15.4.4.2 ***Not used.***

§ 15.4.4.3 ***Not used.***

§ 15.5 Binding Dispute Resolution
§ 15.5.1 Any unresolved controversy or claim arising out of or related to the contract, or the breach thereof, shall be settled by litigation in accordance with the laws of the state of Missouri, except controversies or claims relating to aesthetic effect as provided in Section 4.2.13 and except those waived as provided for in Sections 9.10.4, and 9.10.5, and 15.1.7. Such controversies or claims upon which the Initial Decision Maker has given notice and rendered a decision as provided in Section 15.2.5 shall be subject to litigation.

§ 15.5.2 Any litigation shall be filed in the Circuit Court of St. Louis County in the state of Missouri.

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SECTION 011000
SUMMARY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project information.

B. Contract description.

C. Description of the Work.

D. Work by Owner.

E. Owner occupancy.

F. Contractor use of site and premises.

G. Work sequence.

H. Specification conventions.

1.02 PROJECT INFORMATION

A. Project Name: CEH-CEM Rooftop HVAC Replacement Units

B. Owner's Name: Parkway School District.

C. The Project consists of the replacement and demolition of HVAC rooftop units with Owner furnished RTGs.

1.03 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 005200 - Agreement Form.

1.04 DESCRIPTION OF THE WORK

A. Scope of demolition and removal work is specified in Section 024100.

B. Scope of alterations work is removing existing roof top units and installing new roof top units

C. The Work includes, but is not limited to:

1. After demolition of existing rooftop units, the new units will be installed onto the existing curbs. The new units have a custom curb adapter attached to the units that were designed and sized by Trane. All proposed skirting and/or flashing will be installed to work with the existing curb and ensure a weatherproof seal. The existing electrical and gas supply will be connected to the new units. The existing digital control system wiring will be evaluated and connected by Automatic Controls Equipment Systems. See section 230923.

D. Owner will remove the following items before start of the Work:

1. Loose equipment from work area.

1.05 WORK BY OWNER

A. Owner has awarded a contract for abatement of asbestos containing materials.

1. The asbestos management plans are available for inspection from 8:00 a.m. to 4:00 p.m. Monday through Friday at the Owner's Environmental Group offices located at the District Operations Building, 363 North Woods Mill Road, Chesterfield, Missouri 63017.
2. The asbestos management plans are available while performing the work during normal work hours at the Administrative Offices of the facility at which the work is to be completed.

B. Owner will supply the following for installation by Contractor:

1. HVAC Rooftop Equipment.

1.06 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.07 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Arrange use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others.
   3. Work by Owner.
   4. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may not be used for storage without expressed consent of the Owner.

E. Time Restrictions:
   1. Limit conduct of exterior work to the hours of 7:00 a.m. to 6:00 p.m. or by local ordinance if more restrictive unless given specific written permissionn by the Owner to work outside of these hours..
   2. Limit conduct ofof interior work to the hours of 6:00 a.m. to 11:00 p.m..
   3. Disruptive Work: prior to 7:00 a.m., after 3:45 p.m., or any day school is not in session .
      a. Disruptive work is defined as work that will vibrate the building structure, will cause excessive noise in adjacent classrooms, has potential of releasing noxious fumes, or puts building occupants in a potentially unsafe situation.

F. Utility Outages and Shutdown:
   1. Contractor shall not proceed with utility outage or shutdown without written confirmation from Owner that utility outage or shutdown can commence.
   2. Limit disruption of utility services to hours the building is unoccupied.
   3. Contractor shall notify Owner at least 48 hours in advance of utility outage or shutdown.
   4. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
   5. Prevent accidental disruption of utility services to other facilities.

1.08 WORK SEQUENCE

A. Construct Work in one phase at Contractor's scheduling discretion.
   1. Contractor allowed to begin the Work in the field on or after October 30, 2026
   2. Substantial Completion date for the Work shall be on or before November 2, 2026

1.09 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form.

B. This imperative language is directed to the Contractor, unless specifically noted otherwise.

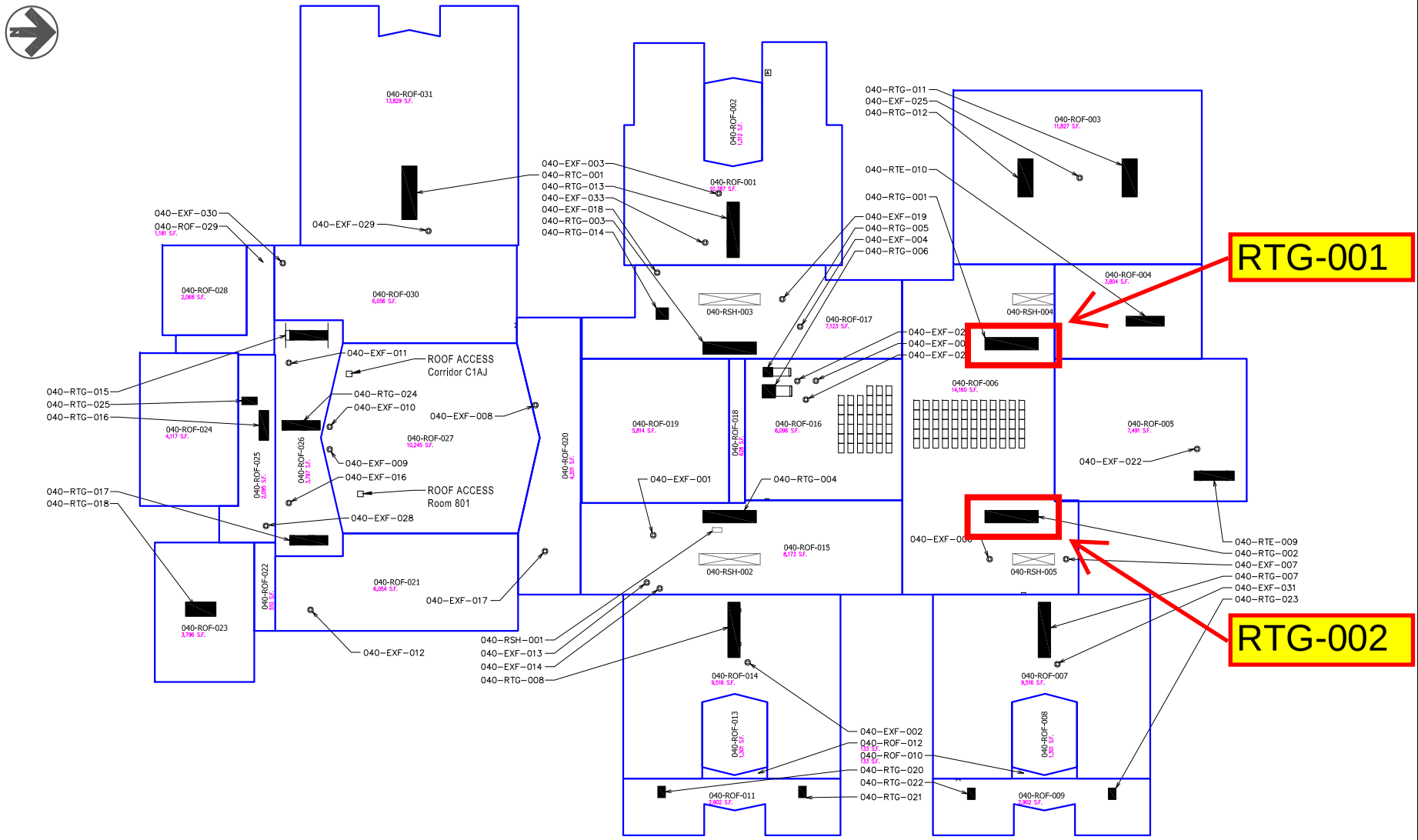
C. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

D. All references to "days" are consecutive calendar days, unless specifcally noted otherwise.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



MECHANICAL LEGEND:

EXF - M-FAN - EXHAUST
RCU - M-REMOTE CONDENSING UNIT
RTC - M-ROOF TOP UNIT - COOLING ONLY
RTG - M-ROOF TOP HVAC UNIT - GAS HEAT
RTE - M-ROOF TOP HVAC UNIT - ELECTRIC HEAT

Prepared by:
Parkway School District
Facilities Division
455 North Woods Mill Road
Chesterfield, Missouri 63017
Tel:314-415-8231
Fax:314-415-8269

Roof Plan

Project Name and Address:
PARKWAY SCHOOL DISTRICT
CENTRAL MIDDLE SCHOOL
471 N. WOODS MILL RD.
CHESTERFIELD, MO. 63017

Revisions

Mark	Date	Description
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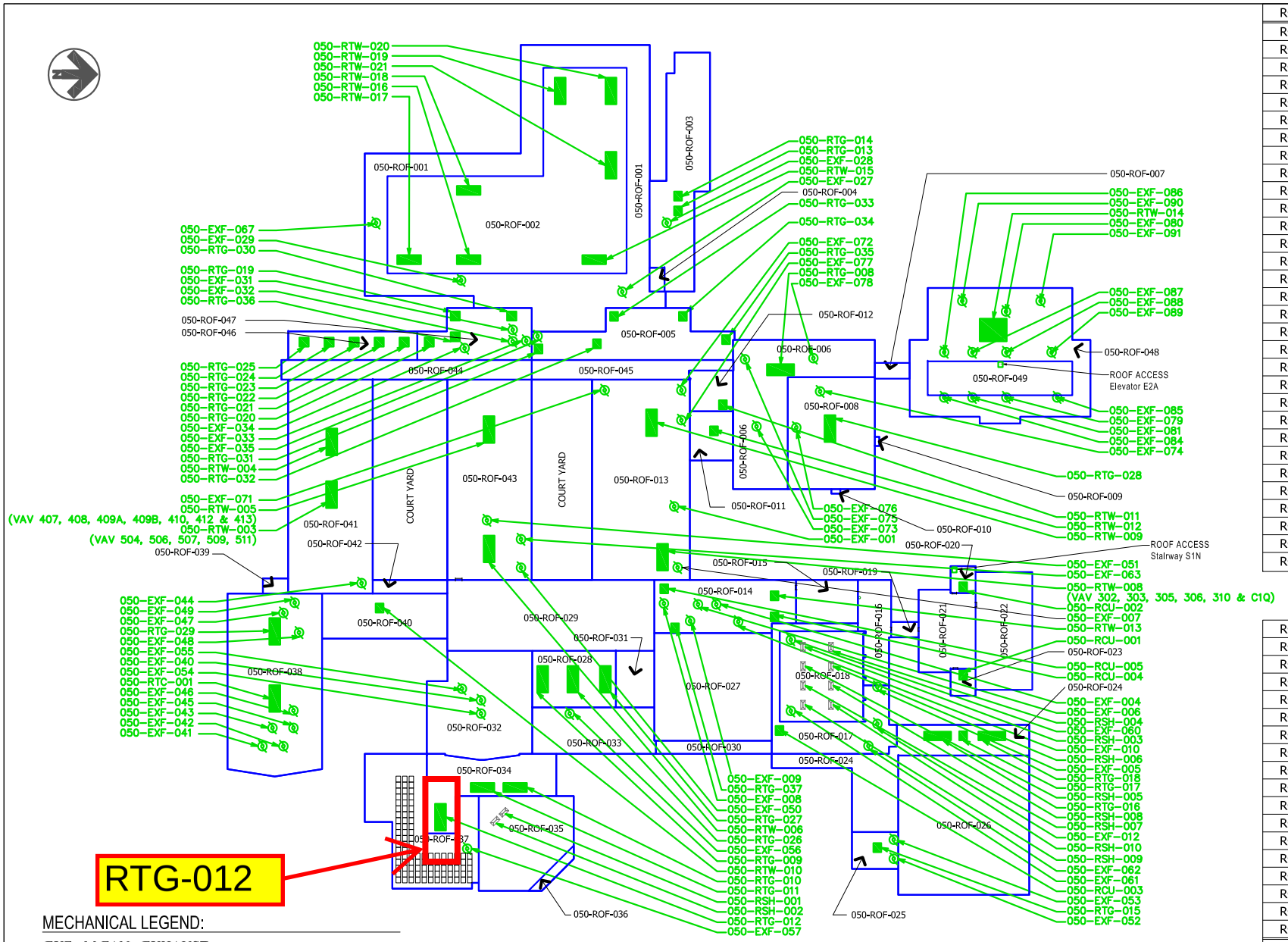
Project Number: N/A
File Name: 040-CEM-ROOF-MODEL-00.dwg
Sheet: MEP-Utilities Roof Plan

Drawn by: B.H.
Designed by: B. Hogan
Approved by: J. Swingle
Date of Issue: 06/02/22

Sheet 1 of 1

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MECHANICAL LEGEND:

EXF - M-FAN - EXHAUST
RCU - M-REMOTE CONDENSING UNIT
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RTE - M-ROOF TOP HVAC UNIT - ELECTRIC HEAT

ROOF NO.	SQ. FOOTAGE
ROF-001	21,330 S.F.
ROF-002	26,041 S.F.
ROF-003	8,234 S.F.
ROF-004	287 S.F.
ROF-005	6,251 S.F.
ROF-006	9,214 S.F.
ROF-007	446 S.F.
ROF-008	7,857 S.F.
ROF-009	33 S.F.
ROF-010	33 S.F.
ROF-011	1,717 S.F.
ROF-012	1,428 S.F.
ROF-013	15,826 S.F.
ROF-014	5,883 S.F.
ROF-015	2,162 S.F.
ROF-016	2,494 S.F.
ROF-017	5,065 S.F.
ROF-018	6,118 S.F.
ROF-019	341 S.F.
ROF-020	543 S.F.
ROF-021	3,664 S.F.
ROF-022	5,389 S.F.
ROF-023	543 S.F.
ROF-024	7,175 S.F.
ROF-025	1,378 S.F.
ROF-026	14,732 S.F.
ROF-027	10,203 S.F.
ROF-028	3,811 S.F.
ROF-029	11,835 S.F.
ROF-030	1,224 S.F.
ROF-031	1,751 S.F.
ROF-032	8,490 S.F.
ROF-033	4,593 S.F.
ROF-034	5,039 S.F.
ROF-035	6,858 S.F.
ROF-036	418 S.F.
ROF-037	8,260 S.F.
ROF-038	13,669 S.F.
ROF-039	309 S.F.
ROF-040	4,575 S.F.
ROF-041	14,604 S.F.
ROF-042	816 S.F.
ROF-043	13,672 S.F.
ROF-044	3,958 S.F.
ROF-045	2,866 S.F.
ROF-046	2,986 S.F.
ROF-047	4,247 S.F.
ROF-048	13,537 S.F.
ROF-049	3,955 S.F.
TOTAL	295,860 S.F.

PARKWAY SCHOOLS

Prepared by:
Parkway School District
Facilities Division
455 North Woods Mill Road
Chesterfield, Missouri 63017
Tel:314-415-8231
Fax:314-415-8269

Roof Plan
Project Name and Address:
PARKWAY SCHOOL DISTRICT
CENTRAL HIGH
369 N. WOODS MILL RD.
CHESTERFIELD, MO. 63017

Revisions

Mark	Date	Description
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Project Number: N/A
File Name: 050-CEH-ROOF-MODEL-00_recover.d
Sheet: MEP-Utilities Roof Plan

Drawn by: B.H.
Designed by: B. Hogan
Approved by: J. Swingle
Date of Issue: 06/09/22

Sheet 1 of 1

R - 1

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Submittal

Prepared For: Parkway School District
Attn: Pam Johnson

Date: April 28, 2026

Customer P.O. Number: *85260324-00*

Job Name: Parkway Central HS and MS
Mammoth Replacements

Opportunity ID: 8624632

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product	
3	Custom Packaged Multizone VAV Units	RTG-001, 002, 012

Jake Schanzmeyer/John Nekic,
Trane U.S. Inc.
101 Matrix Commons Drive
Fenton, MO 63026
Office Phone: (636) 305-3600

The attached information describes the equipment we propose to furnish for this project and is submitted for your approval.

Submittal acceptance and return is a critical step, so please ensure submittals are returned with approval to release to production within 14 days of submittal date.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

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Fan Curve 13

Weight, Clearance & Rigging 24

Accessory 25

Field Wiring 26

Tag Data - Custom Packaged Multizone VAV Units(Qty: 3)

Item	Tag(s)	Qty	Description	Model Number
A1	RTG-001	1	30 Ton Packaged Commercial Roofto	YCD360D4M*1B3GDA00*D***HHB0MK0*0000*0000X
A2	RTG-002	1	30 Ton Packaged Commercial Roofto	YCD360D4M*1B3GDA00*D***HHB0MK0*0000*0000X
A3	RTG-012	1	30 Ton Packaged Commercial Roofto	YCD360DEM*1B3GDA00*D***HHB0MK0*0000*0000X

All Units

R454B DX Cooling, natural gas heat
High efficiency unit – 5 Stages of Cooling
Downflow supply and upflow return
30 Nominal Ton Cooling Capacity
Modulating low gas heat capacity w/ stainless steel heat exchanger
Barometric relief
2" MERV 8 High efficiency, throwaway filters
15 hp supply fan motor
0-100% Economizer, reference enthalpy control
VAV (Discharge Temperature Control) with supply VFD & motor shaft grounding
Factory powered ground fault convenience outlet with disconnect switch
Hinged service access doors
Louvered condenser coil hail guards
Adv Ctrl & BACnet/Modbus Comm. (BCI)
5k SCCR
Stainless steel drain pan
2nd-5th Year Replacement Compressor Warranty
1st Year Parts, Labor and Refrigerant Warranty
5 Year Compressor Parts Warranty
5 Year Heat Exchanger Parts Warranty

Additional Options:

Custom Base to Match Existing Curb
One Piece Unit Lift
Single Point Power Connection in PVM base at Existing Location
Zone Control Damper
Zone Damper Actuators
Automated Logic Zone Controllers (provided by Local CSO, installed by TSC)
Trane Wired sensors (TCS provided and Field installed)
Discharge Air Sensors for Each Zone
BACnet Communication Daisy-Chained for single input/output connection
6 zones (RTG-001, RTG-012)
3 zones (RTG-002)
Factory Mounted Disconnect Switch

Gas-Fired Hydronic Heating System
Lochinvar Knight Boiler – 1 @ 199 MBH Capacity
Closed Loop Precharged 40% Propylene Glycol System
Hot Water Zoned Reheat Coils Headered Together
Reheat sized for 40°F temp rise @ 40% airflow
Boiler Pump
Expansion Tank
Reheat Coils
Modulating 3-Way Control Valves
Circuit Setters
Isolation Ball Valves
Condensate Trap (Fld)
BACnet communication Card

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Performance Data - Packaged Rooftop, Cooling / Heating Units

Tags	RTG-001, RTG-002	RTG-012
Supply airflow (cfm)	9000	9000
Cooling EDB (F)	80.00	80.00
Cooling EWB (F)	67.00	67.00
Cooling Outdoor Air (DB) (F)	95.00	95.00
Leaving unit DB (F)	55.99	55.99
Leaving unit WB (F)	54.01	54.01
Leaving coil DB (F)	52.68	52.68
Leaving coil WB (F)	52.61	52.61
Gross total capacity (MBh)	385.23	385.23
Gross sensible capacity (MBh)	264.35	264.35
Input htg capacity (MBh)	350.00	350.00
Output htg capacity (MBh)	284.00	284.00
Heating EAT (F)	50.00	50.00
Heating LAT (F)	79.30	79.30
Heating delta T (F)	29.30	29.30
ESP (in H2O)	**1.400**	**1.400**
Total static pressure (in H2O)	2.890	2.890
Actual Supply Motor BHP (bhp)	8.69	8.69
Indoor speed (rpm)	778	778
Supply Motor Power (kW) (kW)	6.49	6.49
Outdoor motor power (kW)	0.00	0.00
Compressor power (kW)	26.03	26.03
System power (kW)	36.11	36.11
EER @ AHRI	11.50	11.50
IEER @ AHRI (EER)	17.2	17.2
Min circuit ampacity (A)	**88.00**	**185.00**
Max overcurrent protection (A)	**100.00**	**225.00**
Min disconnect switch size (A)	100.00	250.00
Compressor 1 RLA (A)	14.50	27.70
Compressor 2 RLA (A)	19.80	42.30
Compressor 3 RLA (A)	19.80	42.30
Supply fan FLA (A)	18.00	43.00
Condenser fan FLA (A)	2.20	4.40
Condenser fan count (Each)	3.00	3.00
Crankcase heater FLA (A)	1.00	1.00
Evaporator face area (sq ft)	31.70	31.70
Evaporator face velocity (ft/min)	284	284
Evaporator rows	5	5
Condenser rows	2	2
Estimated operating weight (lb)	**8612.0**	**8612.0**

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RTG-001 MULTIZONE INDIVIDUAL ZONE SCHEDULE

ZONE	DAMPER BLADE COUNT	DUCT LENGTH (IN.)	DUCT WIDTH (IN.)	MAXIMUM AIRFLOW (CFM)	MINIMUM AIRFLOW (CFM)	HEATING MAX AIRFLOW (CFM)	ZONE VELOCITY (FPM)	COIL EAT (°F)	COIL LAT (°F)	REHEAT CAPACITY (MBH)	COIL FLOW (GPM)
RTG-001					10%	40%					
ZONE 01	3	59	20.625	2700	270	1080	320	55	95	46.9	4.69
ZONE 02	3	59	20.625	2700	270	1080	320	55	95	46.9	4.69
ZONE 03	4	59	27.5	3600	360	1440	320	55	95	62.5	6.25
	10			9000						156.2	15.62

* Multizone Dampers vary in length

Hot Water Coil Parameters: 180 EWT, 160 LWT

Zone Coil APD @ Max Airflow: 0.60"

Zone Coil Max WPD: 10 FT HD

RTG-002 MULTIZONE INDIVIDUAL ZONE SCHEDULE

ZONE	DAMPER BLADE COUNT	DUCT LENGTH (IN.)	DUCT WIDTH (IN.)	MAXIMUM AIRFLOW (CFM)	MINIMUM AIRFLOW (CFM)	HEATING MAX AIRFLOW (CFM)	ZONE VELOCITY (FPM)	COIL EAT (°F)	COIL LAT (°F)	REHEAT CAPACITY (MBh)	COIL FLOW (GPM)
RTG-002						40%					
ZONE 01	1	59	6.9	900	90	360	320	55.0	95.0	15.6	1.56
ZONE 02	1	59	6.9	900	90	360	320	55.0	95.0	15.6	1.56
ZONE 03	1	59	6.9	900	90	360	320	55.0	95.0	15.6	1.56
ZONE 04	1	59	6.9	900	90	360	320	55.0	95.0	15.6	1.56
ZONE 05	1	59	6.9	900	90	360	320	55.0	95.0	15.6	1.56
ZONE 06	5	59	34.4	4500	450	1800	320	55.0	95.0	78.1	7.81
	10			9000						156.2	15.62

* Multizone Dampers vary in length

Hot Water Coil Parameters: 180 EWT, 160 LWT

Zone Coil APD @ Max Airflow: 0.60"

Zone Coil Max WPD: 10 FT HD

RTG-012 MULTIZONE INDIVIDUAL ZONE SCHEDULE

ZONE	DAMPER BLADE COUNT	DUCT LENGTH (IN.)	DUCT WIDTH (IN.)	MAXIMUM AIRFLOW (CFM)	MINIMUM AIRFLOW (CFM)	HEATING MAX AIRFLOW (CFM)	ZONE VELOCITY (FPM)	COIL EAT (°F)	COIL LAT (°F)	REHEAT CAPACITY (MBh)	COIL FLOW (GPM)
RTG-3						40%					
ZONE 01	1	20	5.0	643	64	257	926	55.0	95.0	11.2	1.12
ZONE 02	5	20	25.0	3214	321	1286	926	55.0	95.0	55.8	5.58
ZONE 03	3	20	15.0	1929	193	771	926	55.0	95.0	33.5	3.35
ZONE 04	1	20	5.0	643	64	257	926	55.0	95.0	11.2	1.12
ZONE 05	2	20	10.0	1286	129	514	926	55.0	95.0	22.3	2.23
ZONE 06	2	20	10.0	1286	129	514	926	55.0	95.0	22.3	2.23
	14			9000						156.2	15.62

* Multizone Dampers vary in length

Hot Water Coil Parameters: 180 EWT, 160 LWT

Zone Coil APD @ Max Airflow: 0.60"

Zone Coil Max WPD: 10 FT HD

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Mechanical Specifications - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012

General R-454B
The units shall be downflow, horizontal, or mixed airflow. The operating range shall be between 115°F and 0°F in cooling as standard from the factory for all units. All units shall be factory assembled, internally wired, fully charged with R-454B refrigerant and 100% run tested to check cooling operation, fan and blower rotation and control sequence before leaving the factory. Wiring internal to the unit shall be numbered for simplified identification.

Leak Detection
Unit shall be furnished with a leak detection system from the factory. The leak detection system shall consist of one or more refrigerant detection sensors. When the system detects a leak, the unit controller shall initiate mitigation actions.

Compressors
The 3-D Scroll shall provide a completely enclosed compressor chamber with optimized scroll profiles which leads to increased efficiency. The 3-D Scroll shall include a direct-drive, 3600 rpm, suction gas cooled hermetic motor. The compressor shall include a centrifugal oil pump, scroll tips seals, internal heat shield that lowers the heat transfer from discharge and suction gas, oil level sight glass and oil charge valve. Some compressor models shall also provide a dip tube that allows for oil draining, in addition to a low leakage internal discharge check valve to help prevent refrigerant migration. Each compressor shall have a crankcase heater installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Cabinet surface shall be tested 672 hours in salt spray in compliance with ASTM B117. All components shall be mounted in a weather resistant steel cabinet with a painted exterior. Where top cover seams exist, they shall be double hemmed and gasket sealed to prevent water leakage. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have handles and shall be removable while providing a water and air tight seal. Control box access shall be hinged. The indoor air section shall be completely insulated with fire resistant, permanent, odorless, foil faced glass fiber material. The base of the unit shall have provisions for crane lifting.

Hinged Service Access
Filter access panel and supply fan access panel shall be hinged for ease of unit service.

High Efficiency Unit (eStage)
This option shall provide five stages of mechanical cooling with the ability to be at or below 25% compressor displacement at stage one. Service valves shall also be provided factory installed and include suction and discharge 3-way shutoff valves.

Phase and Voltage Monitor
Standard on all Voyager Commercial units. Shall protects 3-phase equipment from phase loss, phase reversal, and low voltage. Any fault condition shall send the unit into an auto stop condition.

Refrigerant Circuits
Each refrigerant circuit shall have independent thermostatic expansion devices, service pressure ports and refrigerant line filter driers factory-installed as standard. An area shall be provided for replacement suction line driers.

Outdoor Fans
The outdoor fan shall be direct-drive statically and dynamically balanced, draw through in the vertical discharge position. The fan motors shall be permanently lubricated and have built-in thermal overload protection.

Evaporator and Condenser Coils
Condenser coils shall have all Aluminum Microchannel coils. Evaporator coils shall be internally finned Copper tubes mechanically bonded to high performance Aluminum plate fins. All coils shall be leak tested at the factory to ensure pressure integrity. The evaporator coil is pressure tested to 450 psig and the condenser coil at 650 psig. All dual circuit evaporator coils shall be of intermingled configuration. Sloped condensate drain pans are standard.

Louvered Hail Guard
Louvered, hail protection quality coil guards are available for condenser coil protection.

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Stainless Steel Drain Pans
Sloped stainless steel evaporator coil drain pans shall be durable, long-lasting and highly corrosion resistant.

High/Low Modulating Gas Heat
The heating section shall have a drum and tube heat exchanger(s) design with primary and secondary surfaces of corrosion resistant aluminized steel or optional stainless steel (all modulating gas heat units shall have stainless steel). A forced combustion blower shall supply premixed fuel to a single burner ignited by a pilotless shot surface ignition system. In order to provide reliable operation, a regulated gas valve shall be used that requires blower operation to initiate gas flow. On an initial call for heat, the combustion blower shall purge the heat exchanger(s) 45 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat. Modulating gas turn down ratio on high fire units is accomplished by allowing the furnaces to act independently of one another. The modulating bank is activated first and is allowed to modulate itself to meet the heating needs. If the modulating bank is unable to meet the need at high fire, the second bank is turned on and then the first bank again modulates to the appropriate level. This system creates a nearly seamless range of capacity from low fire on the modulating bank to high fire of both furnaces together.

Indoor Fan, 60 Hz Supply Motor
Unit will have belt driven, forward curve, centrifugal fans with fixed motor sheaves. The supply fan motors will be circuit breaker protected. All 60 Hz supply fan motors meet the Energy Independence and Security Act of 2009 (EISA).

Variable Frequency Drive
Unit shall include factory-installed and tested variable frequency drive[s] (VFD) to provide motor speed modulation. The VFD shall receive a 0-10VDC speed signal from the unit controller. The drive will respond to the signal by accelerating or decelerating to maintain the controlling set point (duct static, space pressure, etc). VFD shall also include the following features:

1. Designed, constructed, and tested in accordance with NEMA ICS, NFPA, and IEC standards and housed in a plastic IP20 enclosure.

2. DC link reactors on both the positive and negative rails of the DC bus equal to 3% impedance to minimize power line harmonics.

3. Full rated output current continuously - 110% of rated current for 60 seconds and 160% of rated current for up to 0.5 second while starting.

4. Isolation between the Drive'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.

5. Audible noise reduction through automatic adjustment of the carrier frequency and frequency avoidance.

6. Rated at 40°C with a standard operating range of -10° to 50°C (14° to 124°F) ambient temperatures and 0 to 95% relative humidity.

7. Self-diagnostics and motor protections such as: cULus listed overload, phase loss, and internal thermal overload.

8. Off/Stop and Auto/Start selector switches to start and stop the AC Drive and determine the speed reference.

   a. On units with bypass, an AC Drive/Off/Bypass hand selector switch shall be provided in the unit control box

   b. In DRIVE mode speed reference shall be provided by a 0-10 VDC analog input.

9. A keypad interface which shall be programmable by language and feature multiple lines for easy reading

10. Controlled and/or accessible points such as AC Drive Start/Stop, speed reference, and fault diagnostics.

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11. Meter points such as motor power in HP, motor power in kW, motor kW-hr, motor current, motor voltage, hours run, DC link voltage, thermal load on motor, Thermal load on AC Drive and Heatsink temperature.

12. Troubleshooting features such as:
    a. AC Drive memory storage of the last 10 faults and related operational data
    b. Four simultaneous displays: frequency or speed, run time, output amps and output power
    c. Keypad which shall display: Reference Signal Value, Output Frequency in Hz or percent, Output Amps, Motor HP, Motor kW, kW

13. Coated circuit boards for protection against corrosive environments

14. Field readable BACnet points to allow for communication of stauts, setpoints and diagnostics to the BAS.

Motor Shaft Grounding Ring
Motors shall have internal bearing protection for use withVFDs to provide a conductive discharge path away from the motor bearings to ground. Bearing Protection Rings shall be circumferential rings with conductive micro fibers which provide the path of least resistance and dramatically extend motor life.

2" High Efficiency Filters - MERV 8
2" High Efficiency MERV 8 filters will be standard.

Barometric Relief
The barometric relief damper shall be optional with the economizer. Option shall provide a pressure operated damper for the purpose of space pressure equalization and be gravity closing to prohibit entrance of outside air during the equipment off cycle.

Economizer with Reference Enthalpy Control
An economizer shall be factory installed. The assembly shall include: 0-100% fully modulating dampers, minimum position setting, preset linkage, wiring harness and reference enthalpy control.

Controls
Unit shall be completely factory wired with necessary controls and terminal block for power wiring. Units shall provide an external location for mounting fused disconnect device. The controls shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. The controls shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

Unit Interrupt Rating (Standard Short Circuit Current Rating-SCCR)
A 5,000 Amp rating shall be applied to the unit enclosure using a non-fused circuit breaker for disconnect switch purposes. Fan motors, compressors, and electric heat circuits shall be provided with protective devices that will provide the unit rated level of fault protection.

Non-Fused Disconnect Switch
A factory installed non-fused disconnect switch with external handle shall be provided and shall satisfy NEC requirements for a service disconnect. The non-fused disconnect shall be mounted inside the unit control box.

GFI Convenience Outlet (Factory Powered)
A 15A, 115V Ground Fault Interrupter convenience outlet shall be factory installed. It shall be wired and powered from a factory mounted transformer. Unit mounted non-fused disconnect with external handle shall be furnished with factory powered outlet.

BACnet Communications
The BACnet communications interface shall allow the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

System Controls
The zoning microprocessor based terminal unit controller provides accurate, pressure dependent control through the use of a proportional integral control algorithm and direct digital control technology. The controllers monitors zone temperature setpoints, zone temperatures, zone temperature rates of change, and actual zone damper positions. The

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controllers shall then position the dampers for proper airflow to maintain the current zone temperature setpoints. Airflow is controlled within software adjustable minimum and maximum damper position setpoints. System airflows will be pressure dependent. The unit will control to a field adjustable cooling setpoint. Controllers shall have provisions for controlling supplemental or perimeter heat. The frontend system controller shall scan all zones and thermostats to determine deviation from setpoint, time of deviation, and the number of zones requiring a temperature adjustment. Based on this information, the zone control dampers will be opened or closed and the zoned heat will be enabled or disabled (if installed). A Trane zone sensor is required.

The frontend system controller shall also monitor discharge air pressure and control a variable frequency drive to maintain appropriate system pressures in cooling mode. In heating mode (MWU/DWU), the unit will ramp up the variable frequency drive to maximum speed and all of the zone dampers will open fully.

Wired Zone Sensors
This electronic device utilizes a thermistor to vary the voltage output in response to changes in the zone temperature. The setpoint adjustment range is 50.0 F - 88.0 F. This sensor is provided with an externally adjustable set point, a timed override button and a timed override cancel button. An optional communications jack is available which snaps into the enclosure backplate. One sensor for each zone shall be factory supplied.

Zone Actuators
Actuators controlling the zone dampers are Belimo LMB24 3-wire, 24-VAC, with floating-point, quarter-turn actuator with linkage release button. Actuator has a constant drive rate independent of load, a rated torque of 45 in-lb, a 95 second drive time, and is non-spring return. Travel is terminated by end stops at fully-opened and -closed positions. Internal electronic control prevents motor stall when motor reaches end stops.

Zone Dampers
The zone dampers shall be extruded aluminum or steel airfoil shape construction with blade edge and jam seals. Control shaft is a removable ½" diameter which extends 6" beyond frame. The damper is extremely low air leakage of less than 6 cfm/sq. ft. at 1 in. w.g.

Base Cabinet
The zoning section is constructed of 16 gauge galvanized steel, 1-½" square tubing and painted with standard Trane slate gray paint.

Lifting Lugs
Lifting lugs will be provided on the zoning base. The lifting lugs are designed and built to lift the entire unit as one piece.

Base Insulation
The base insulation is manufactured from inorganic glass fibers bonded together with thermosetting resin. The 1-½" thick insulation has a thermal conductivity of 0.23 BTU-in/(hr-ft2-F). It is foil face with a vapor retarder material which meets the requirements of NFPA 90A and 90B. The insulation is secured with mechanical fasteners and covered with foil tape. All seams are tightly sealed with foil tape. The zoning section doors have a doublewall positively latching door and insulated with 1" fiber glass insulation.

Power Wiring
Power will need to be run to the disconnect switch located on the Voyager's power panel. This unit is single point power.

Hot Water Zone Reheat
Each zone will include a hot water reheat coil. Reheat coils will include a galvanized sheet metal frame, aluminum fins and copper tubes. Each zone will also include a factory provided 3-way, modulating control valve, isolation shut-off valves and a circuit setter. The circuit setters shall be used to balance the water flow going to each reheat coil.

Each coil will be piped to a common header, which will need to be connected to the field piping system. The header will be wrapped with ½" Armaflex pipe insulation.

Self-Contained Hydronic Heating (184.0 MBH Output)
The unit will be equipped with a closed-loop hydronic heating system. The unit's reheat coils shall be factory piped to the boiler system. Each coil will include a factory provided 3-way, modulating control valve, isolation shut-off valves and a circuit setter. The circuit setters shall be used to balance the water flow going to each coil. The system will

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include an air scoop, air vent, expansion tank, circulating pump, discharge and suction line pressure gauges and fill/drain valves. The system will be factory charged with 40% propylene glycol solution to protect the hydronic system from freezing damage. The header will be wrapped with ½" Armflex pipe insulation.

Gas Fired Boiler
The boiler shall be a Lochinvar Knight having a modulating input rating of 199,999 Btu/Hr, an output of 184,000 Btu/Hr and shall be operated on Natural Gas. The boiler shall be capable of full modulation, firing down to 10% of rated input with a turndown ratio of 10:1.

The boiler shall bear the ASME "H" stamp for 80 psi working pressure and shall be National Board listed. The boiler shall have a fully welded, stainless steel, fire tube heat exchanger. There shall be no banding material, bolts, gaskets or "O" rings in the pressure vessel construction. The heat exchanger shall be designed for a single-pass water flow to limit the water side pressure drop. The condensate collection basin shall be constructed of welded stainless steel. The complete heat exchanger assembly shall carry a twelve (15) year limited warranty.

The boiler shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber shall be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port shall be provided. The burner shall be a premix design and constructed of high temperature stainless steel with a woven metal fiber outer covering to provide modulating firing rates. The boiler shall be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system, to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency. The boiler shall operate in a safe condition at a derated output with gas supply pressures as low as 4 inches of water column. The burner flame shall be ignited by direct spark ignition with flame monitoring via a flame sensor.

The boiler shall utilize a 24 VAC control circuit and components. The control system shall have a factory installed display for boiler set-up, boiler status, and boiler diagnostics. All components shall be easily accessed and serviceable from the front and top of the jacket. The boiler shall be equipped with a temperature/pressure gauge; high limit temperature control with manual reset; ASME certified pressure relief valve set for 80 psi; outlet water temperature sensor with a dual thermistor to verify accuracy; system supply water temperature sensor; outdoor air sensor, flue temperature sensor with dual thermistor to verify accuracy; low water cut off with manual reset, blocked drain switch and a condensate trap for the heat exchanger condensate drain.
The boiler shall be factory wired for single point power. Supply voltage shall be 120 volt / 60 hertz / single phase with a total amp draw of 4.0A.

The boiler shall be installed and vented with a direct vent system with horizontal sidewall termination of both the exhaust vent and combustion air. The flue shall be Category IV approved material constructed of PVC or CPVC. A separate pipe shall supply combustion air directly to the boiler from the outside. The boiler's total combined air and exhaust venting intake length shall not exceed 100 equivalent feet. The air inlet must terminate on the roof top with the manufacturer's specified air inlet cap. All venting installations shall be in accordance with the latest edition of the National Fuel Gas Code, ANSI Z223.1, or applicable provisions of local building codes.

The boiler shall have an independent laboratory rating for Oxides of Nitrogen (NOx) to meet the requirements of South Coast Air Quality Management District in Southern California and the requirements of Texas Commission on Environmental Quality. The manufacturer shall verify proper operation of the burner, all controls and the integrity of the heat exchanger by connection to water and venting for a factory fire test prior to shipping.

All unit installations must be in accordance with the National Fuel Gas Code ANSI Z223.1 (NFPA 54) in the US and Can/CGA-B149 Installation Code in Canada and all applicable local codes and ordinance requirements. Field installation includes gas piping, condensate drain/trap and flue venting per local codes.

System Pump
The Grundfos system pump shall be specifically designed for heating systems. UPS Series pump is of the canned rotor type, i.e. pump and motor form an integral unit without shaft seal and with only two gaskets for sealing. The bearings are lubricated by the pumped liquid. Other features include 3ph two-speed motors, stainless steel rotor can, bearing plate, stator housing in aluminum alloy, cast iron housing and built-in thermal overload switch. The Lochinvar boiler will control the operation of the pump motor starter.

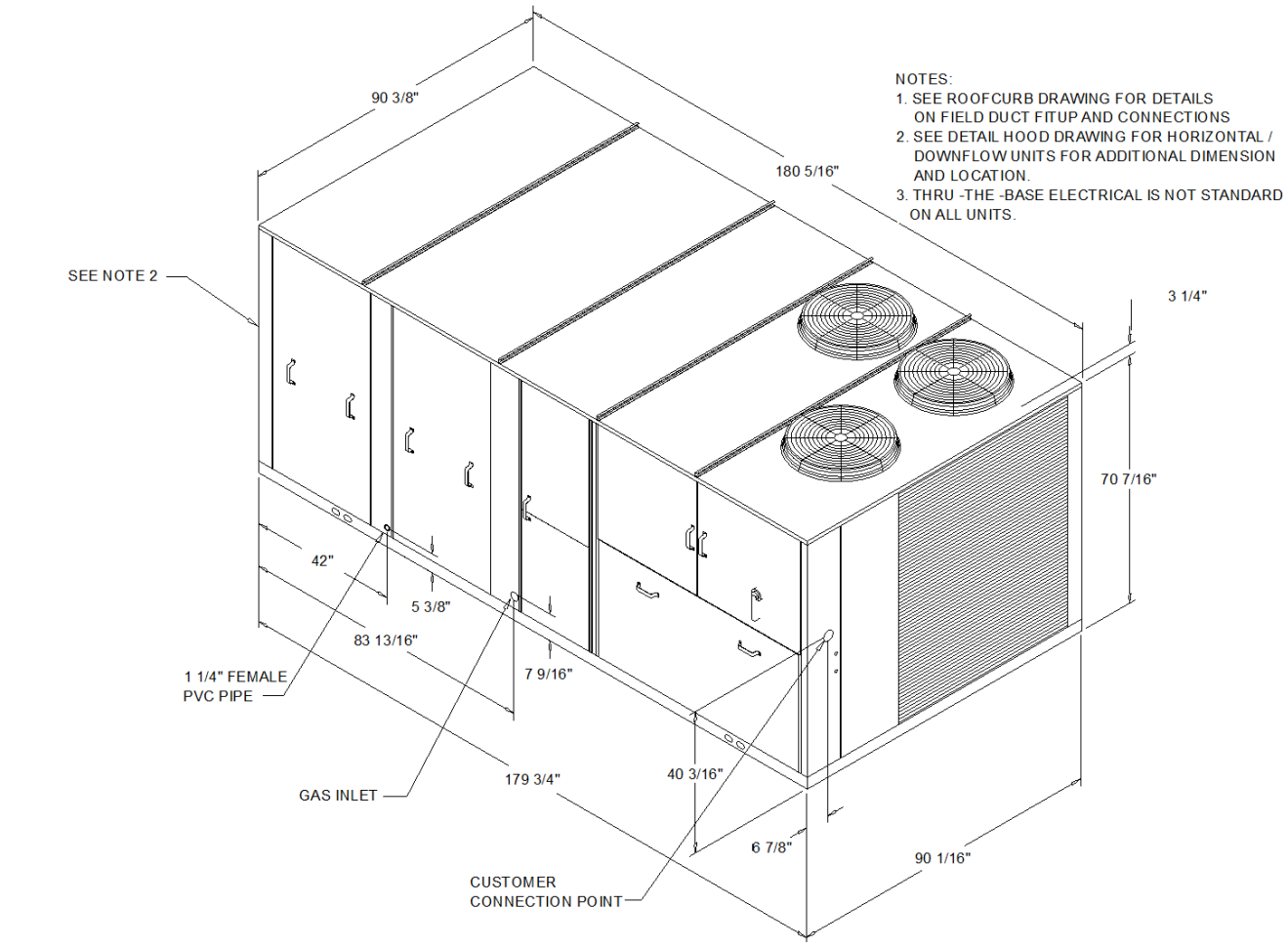
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Panel Heater

The boiler sheet metal enclosure will be equipped with a panel heater to maintain proper cabinet temperatures. The heater element is controlled by an adjustable thermostat which will turn off the heater when the set cabinet temperature has been achieved and on once the cabinet temperature falls below the set value. The indicator light will show when the heater is on/off. The fan operation will be enabled during the AUTO mode.

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Dimensional Drawings - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012



PLAN VIEW

DOWNFLOW SUPPLY AND UPFLOW CONFIGURATION

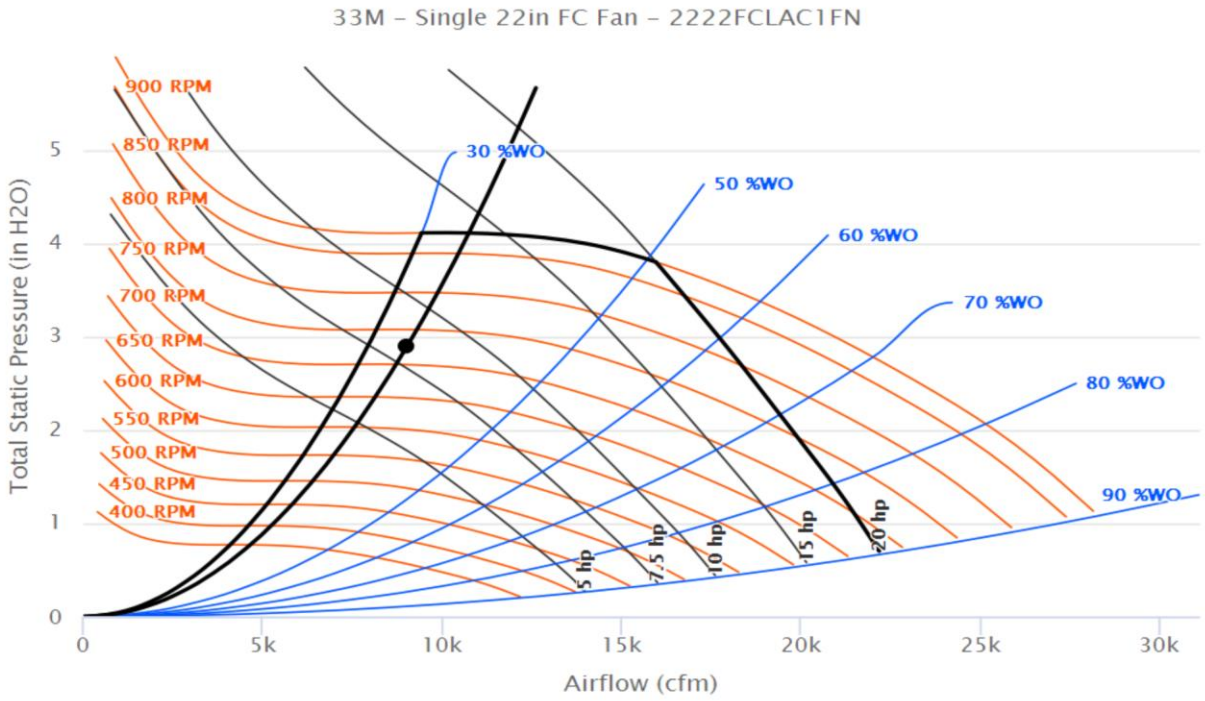
DIMENSIONAL DRAWING

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Fan Curve - Packaged Rooftop, Cooling / Heating Units
Item: A1 Qty: 1 Tag(s): RTG-001

Fan Details

Unit Size		**Operating Brake Power**	8.69 bhp
Operating Airflow	9,000 cfm	**Altitude**	0.00 ft
Operating Static Pressure	2.890 in H2O	**Design Temp.**	52.68 F
Operating RPM	778 rpm		

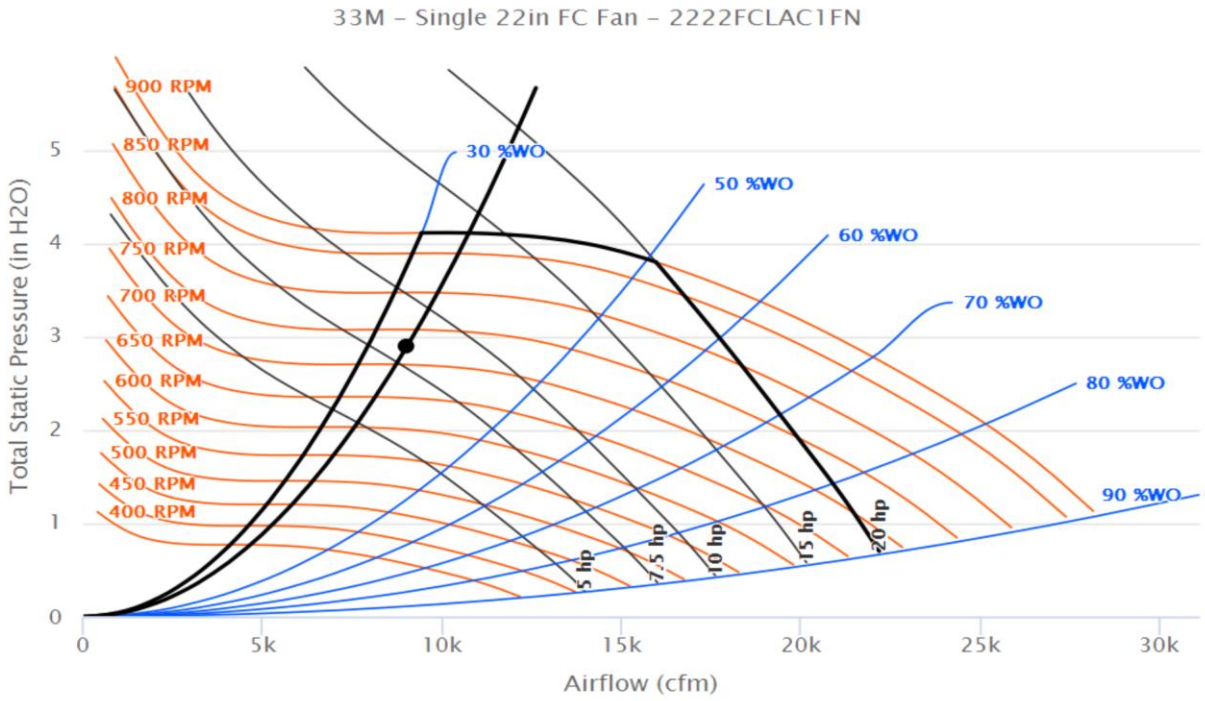


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Fan Curve - Packaged Rooftop, Cooling / Heating Units
Item: A2 Qty: 1 Tag(s): RTG-002

Fan Details

Unit Size		**Operating Brake Power**	8.69 bhp
Operating Airflow	9,000 cfm	**Altitude**	0.00 ft
Operating Static Pressure	2.890 in H2O	**Design Temp.**	52.68 F
Operating RPM	778 rpm		

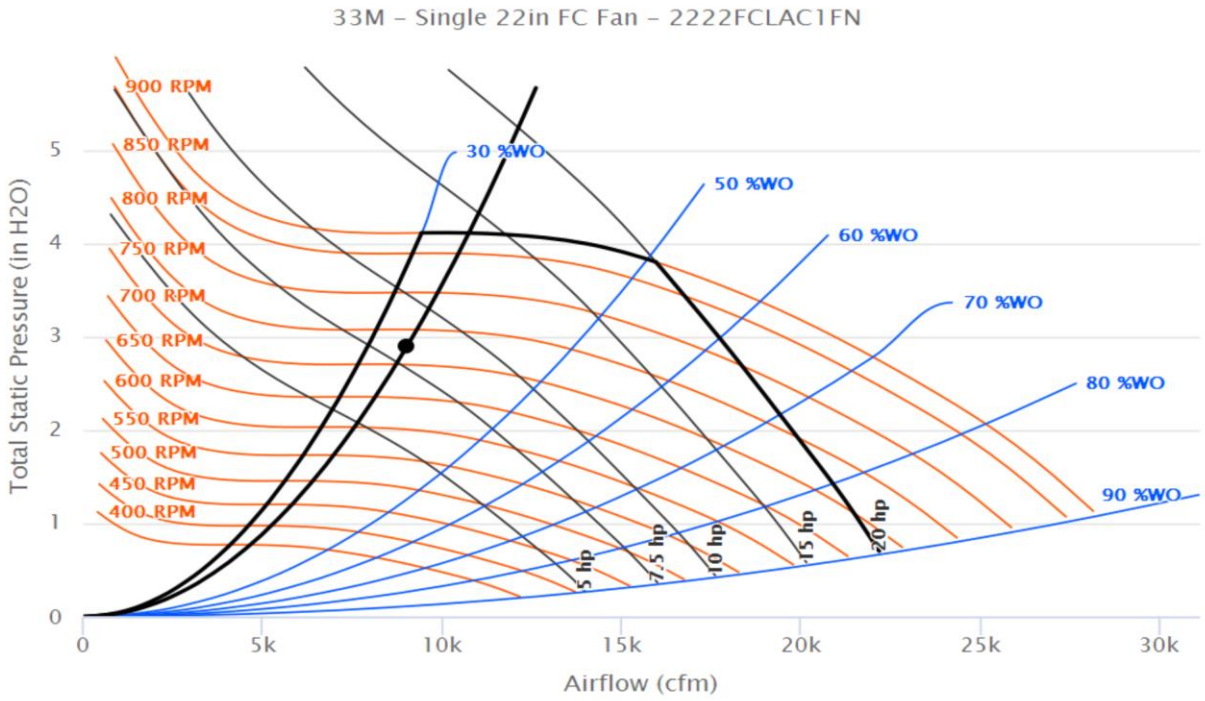


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Fan Curve - Packaged Rooftop, Cooling / Heating Units
Item: A3 Qty: 1 Tag(s): RTG-012

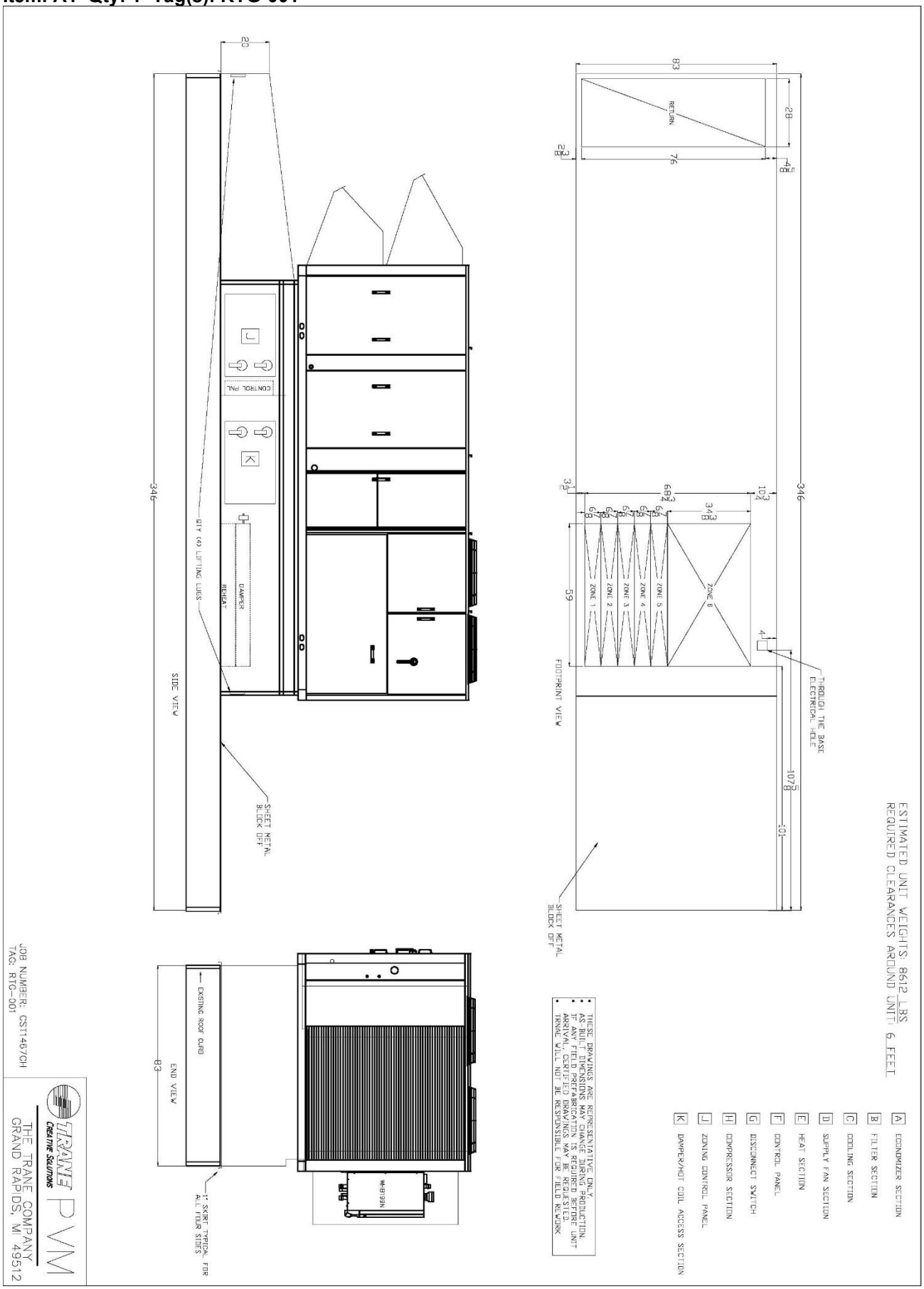
Fan Details

Unit Size		**Operating Brake Power**	8.69 bhp
Operating Airflow	9,000 cfm	**Altitude**	0.00 ft
Operating Static Pressure	2.890 in H2O	**Design Temp.**	52.68 F
Operating RPM	778 rpm		



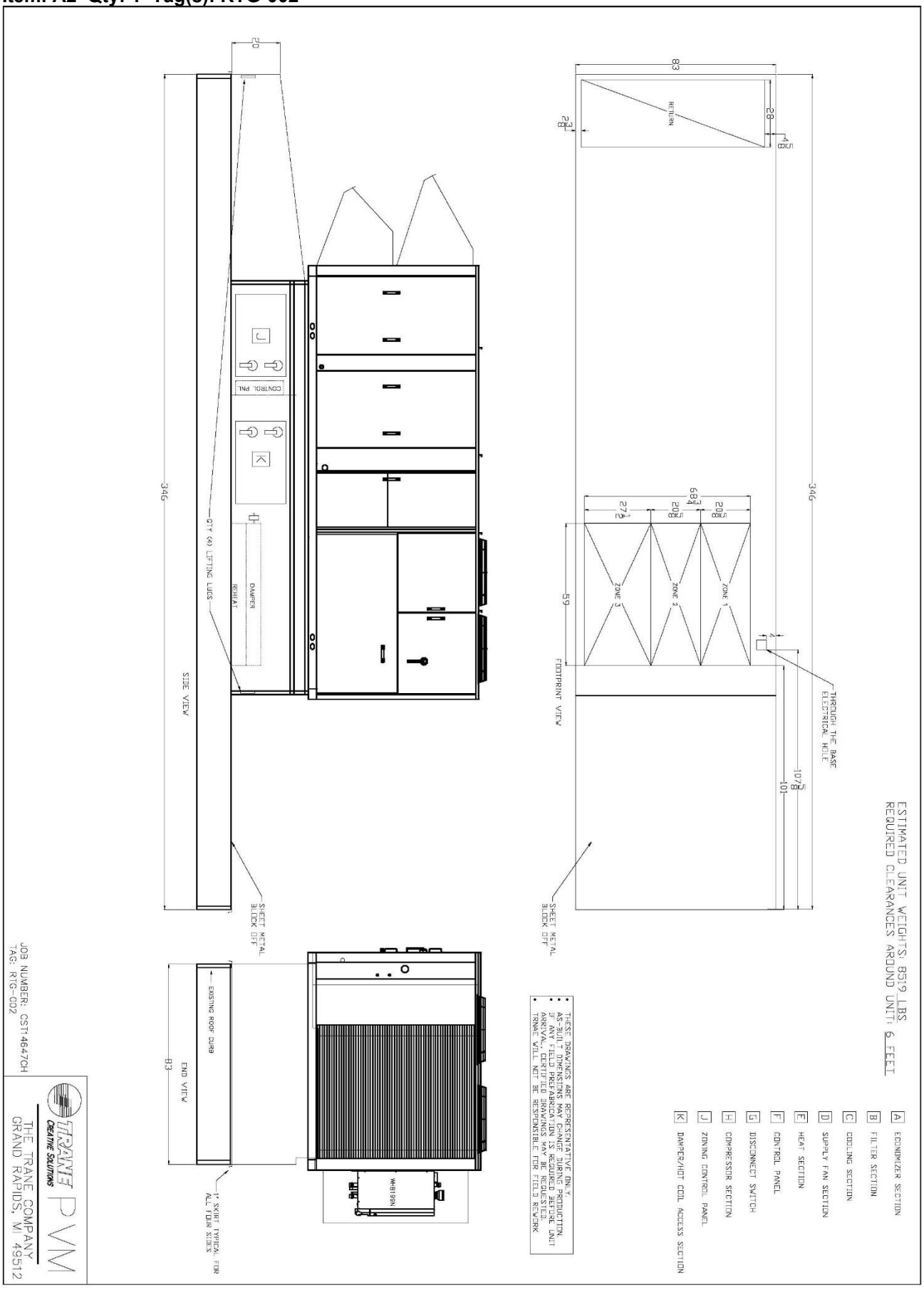
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Layout Drawing - Packaged Rooftop, Cooling / Heating Units
Item: A1 Qty: 1 Tag(s): RTG-001



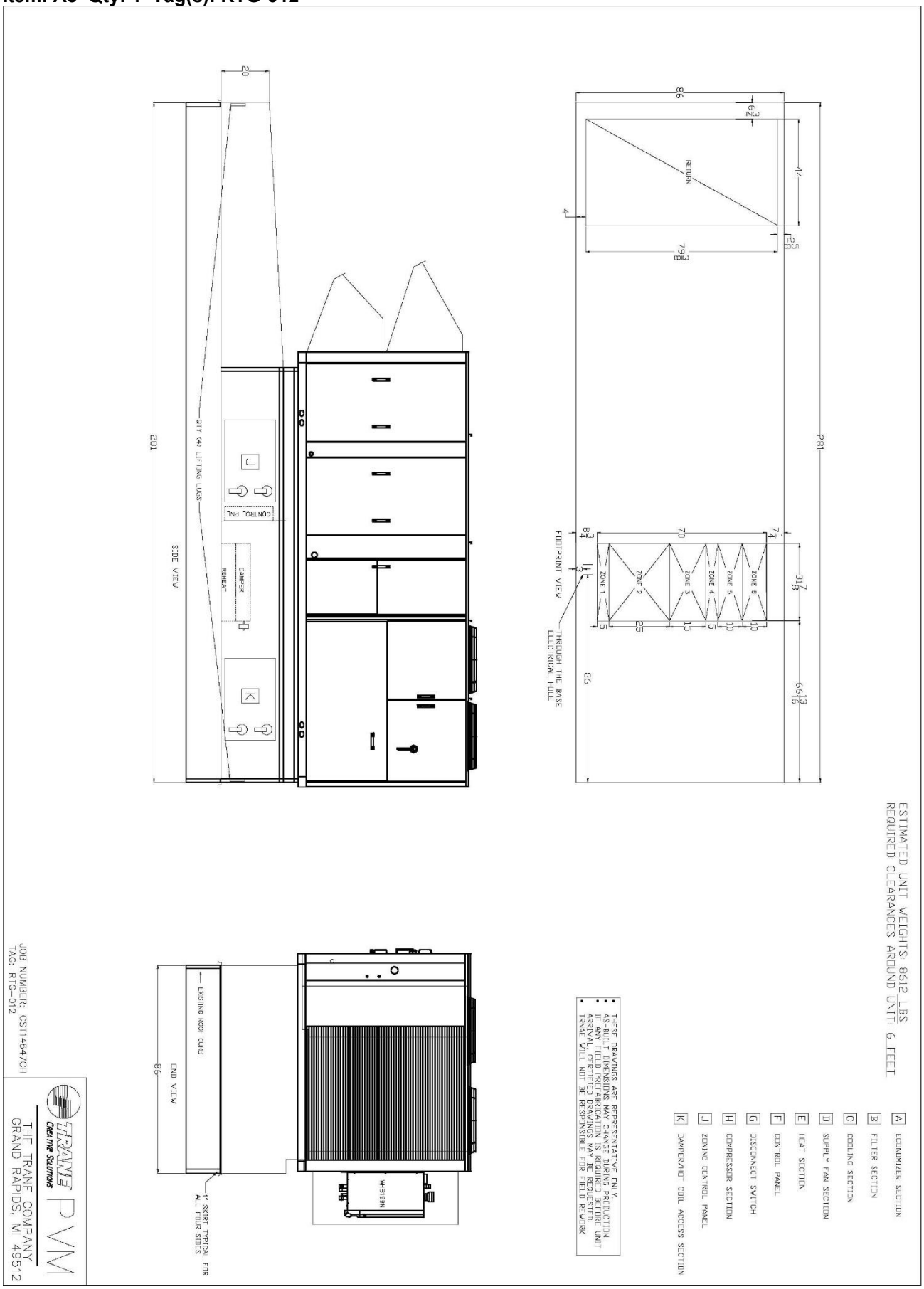
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Layout Drawing - Packaged Rooftop, Cooling / Heating Units
Item: A2 Qty: 1 Tag(s): RTG-002



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Layout Drawing - Packaged Rooftop, Cooling / Heating Units
Item: A3 Qty: 1 Tag(s): RTG-012



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Boiler Summary - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012

Lochinvar
HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIGHT® FIRE TUBE BOILER PRODUCT SUMMARY
(WHB) 55,000 - 399,000 BTU/HR

	WHB055	WHB085	WHB110	WHB155	WHB199	WHB285	WHB399
WATER							
GALLON CAPACITY	2.3	2.2	3.2	3.2	5.0	4.9	6.5
HEATING SURFACE (SQ. FT.)	5.92	8.33	10.00	14.07	15.66	21.60	36.58
WATER CONNECTIONS	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/2"
20°F ΔT WATER FLOW (GPM)	5	8	10	15	19	27	38
HEAD LOSS (FT. OF HD.)	0.27	0.94	1.53	3.50	1.13	2.42	1.42
35°F ΔT WATER FLOW (GPM)	3	5	6	9	11	16	22
HEAD LOSS (FT. OF HD.)	0.10	0.37	0.55	1.45	0.38	0.85	0.48
MAX. WORKING PRESSURE (PSI)	80	80	80	80	80	80	80
# OF RELIEF VALVES	1	1	1	1	1	1	1
RELIEF VALVE SIZE	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
RELIEF VALVE RATING (MBH)	535	535	535	535	535	535	535
RELIEF VALVE PRESSURE RATING (PSI)	30	30	30	30	30	30	30
GAS							
INLET CONNECTION	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"
MAX. INLET PRESSURE, NAT	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, NAT	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.
MAX. INLET PRESSURE, LP	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.	14.0" w.c.
MIN. INLET PRESSURE, LP	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.
BTU/HR INPUT	55,000	85,000	110,000	155,000	199,000	285,000	399,000
BTU/HR OUTPUT (HIGH FIRE)	51,000	79,000	102,000	144,000	184,000	264,000	377,000
BTU/HR OUTPUT (LOW FIRE)	7,700	7,900	10,200	14,400	18,400	26,400	37,700
ELECTRICAL							
VOLTAGE/HEATER	120	120	120	120	120	120	120
VOLTAGE/CONTROL	24	24	24	24	24	24	24
FLA	1.8	2.1	2.1	2.2	3.3	3.6	4
MCA	2.3	2.7	2.7	2.8	4.2	4.5	4.5
DIMENSIONS							
HEIGHT	40"	39-3/4"	41-1/4"	41-1/4"	41-1/4"	41-3/4"	43-5/8"
WIDTH	18-3/4"	18-3/4"	18-3/4"	18-3/4"	18-3/4"	18-3/4"	25-1/4"
DEPTH	16"	16"	19"	19-1/8"	19-1/8"	21-1/8"	21-7/8"
SERVICE CLEARANCES							
FRONT	24"	24"	24"	24"	24"	24"	24"
BOTTOM	24"	24"	24"	24"	24"	24"	24"
RIGHT SIDE	0"	0"	0"	0"	0"	0"	0"
LEFT SIDE	12"	12"	12"	12"	12"	12"	12"
TOP	24"	24"	24"	24"	24"	24"	24"
DIRECT VENTING							
SIZE	2"	2"	3"	3"	3"	3"	4"
VENT CATEGORY	IV	IV	IV	IV	IV	IV	IV
VENT MATERIAL	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP	PVC/CPVC/SS/PP

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WHB-PS-02

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Pump Summary - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A2 Qty: 2 Tag(s): RTG-001, RTG-002

Submittal Data

PROJECT: CST14647CH	UNIT TAG: RTG-001, RTG-002	QUANTITY: 2
	TYPE OF SERVICE:	
REPRESENTATIVE:	SUBMITTED BY:	DATE:
ENGINEER:	APPROVED BY:	DATE:
CONTRACTOR:	ORDER NO.:	DATE:



Note! Product picture may differ from actual product

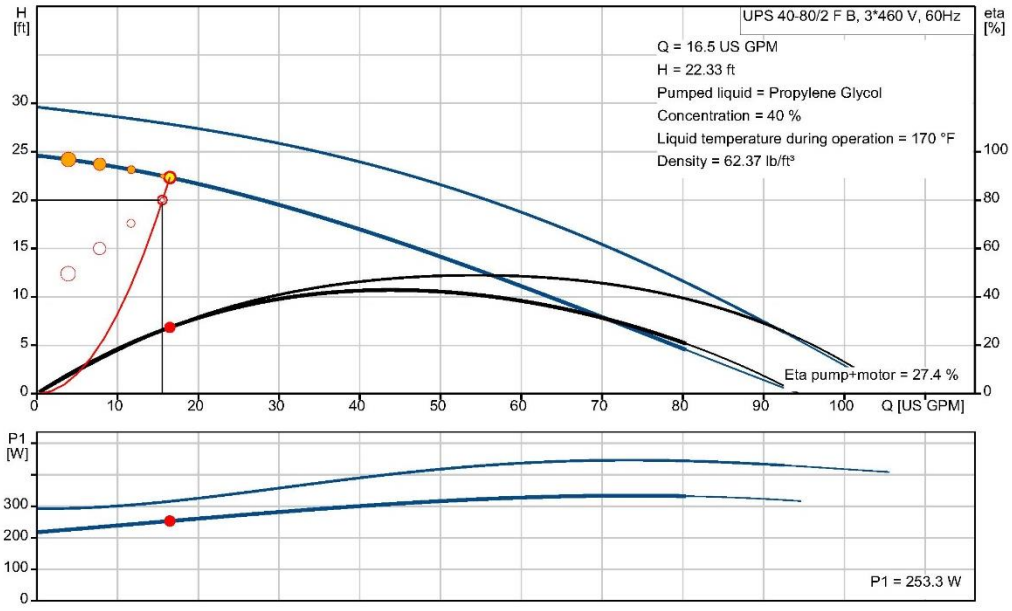
UPS 40-80/2 F B

UPS B is a three-speed circulator pump with a corrosion-resistant bronze pump housing designed for hot-water recirculation. The pump provides reliable and maintenance-free operation.

Conditions of Service	
Flow:	16.5 US GPM
Head:	22.33 ft
Efficiency:	27.4 %
Liquid:	Propylene Glycol
Temperature:	170 °F
NPSH required:	32.81 ft
Specific Gravity:	1.001

Pump Data	
Liquid temperature range:	14 .. 248 °F
Maximum ambient temperature:	104 °F
Pipe connection:	GF 40/43
Product number:	96402770

Motor Data	
Max. power input:	440 W
Mains frequency:	60 Hz
Enclosure class:	IPX4D
Thermal protection:	external



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Pump Summary - Packaged Rooftop, Cooling / Heating Units
Item: A3 Qty: 1 Tag(s): RTG-012

Submittal Data

PROJECT: CST14647CH	UNIT TAG: RTG-012	QUANTITY: 1
	TYPE OF SERVICE:	
REPRESENTATIVE:	SUBMITTED BY:	DATE:
ENGINEER:	APPROVED BY:	DATE:
CONTRACTOR:	ORDER NO.:	DATE:



Note! Product picture may differ from actual product

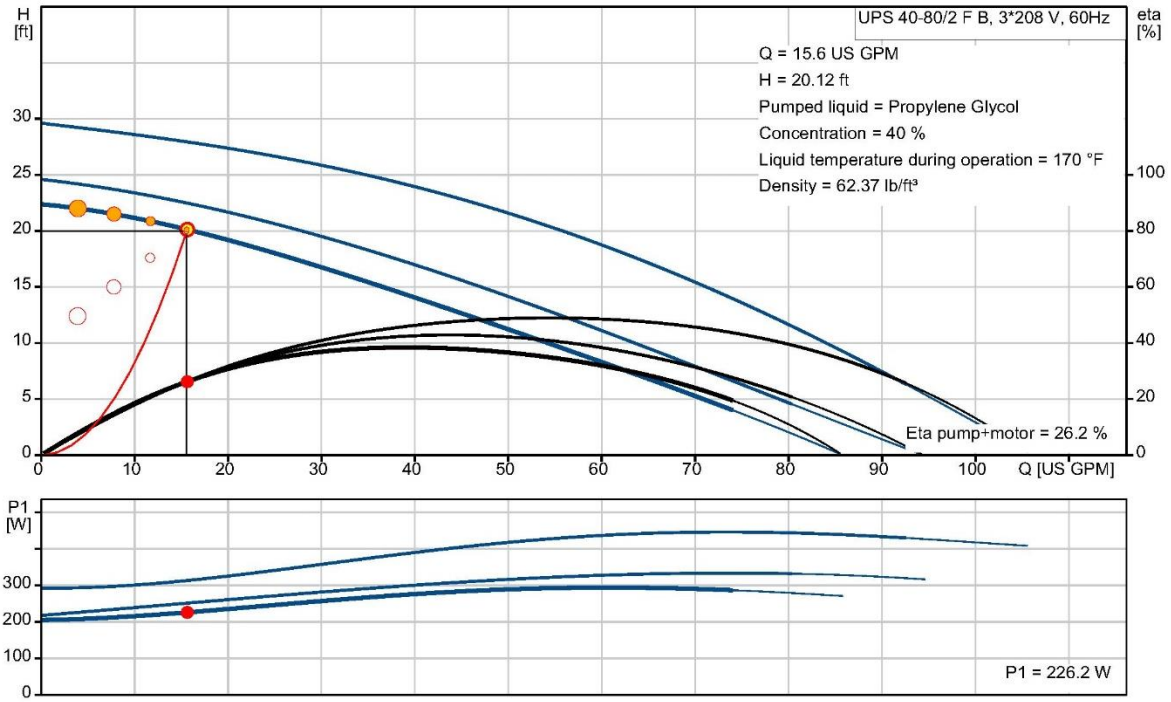
UPS 40-80/2 F B

UPS B is a three-speed circulator pump with a corrosion-resistant bronze pump housing designed for hot-water recirculation. The pump provides reliable and maintenance-free operation.

Conditions of Service	
Flow:	15.6 US GPM
Head:	20.12 ft
Efficiency:	26.2 %
Liquid:	Propylene Glycol
Temperature:	170 °F
NPSH required:	32.81 ft
Specific Gravity:	1.001

Pump Data	
Liquid temperature range:	14 .. 248 °F
Maximum ambient temperature:	104 °F
Pipe connection:	GF 40/43
Product number:	96402769

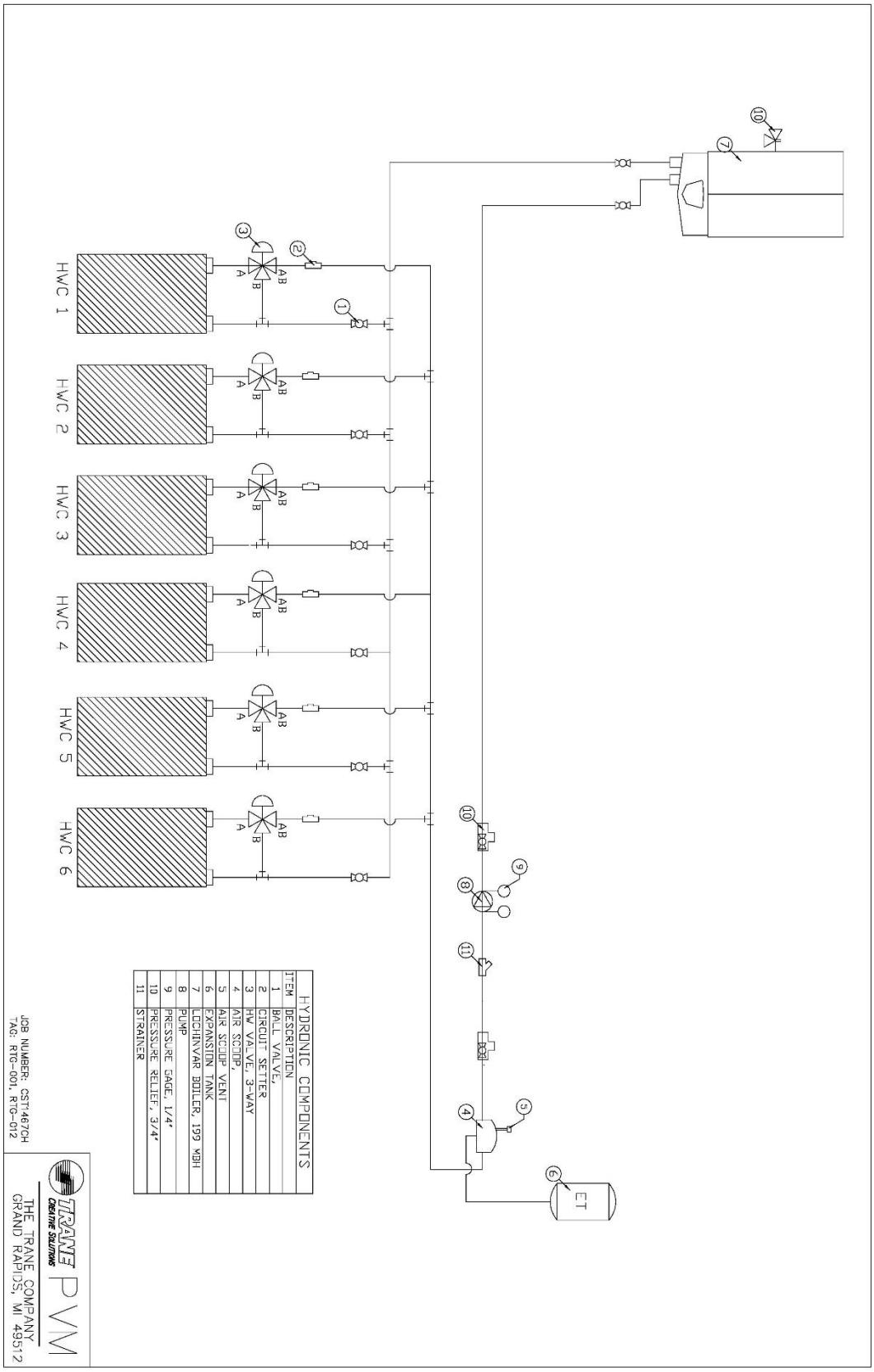
Motor Data	
Max. power input:	440 W
Rated voltage:	208-230 V
Mains frequency:	60 Hz
Enclosure class:	IPX4D
Thermal protection:	external



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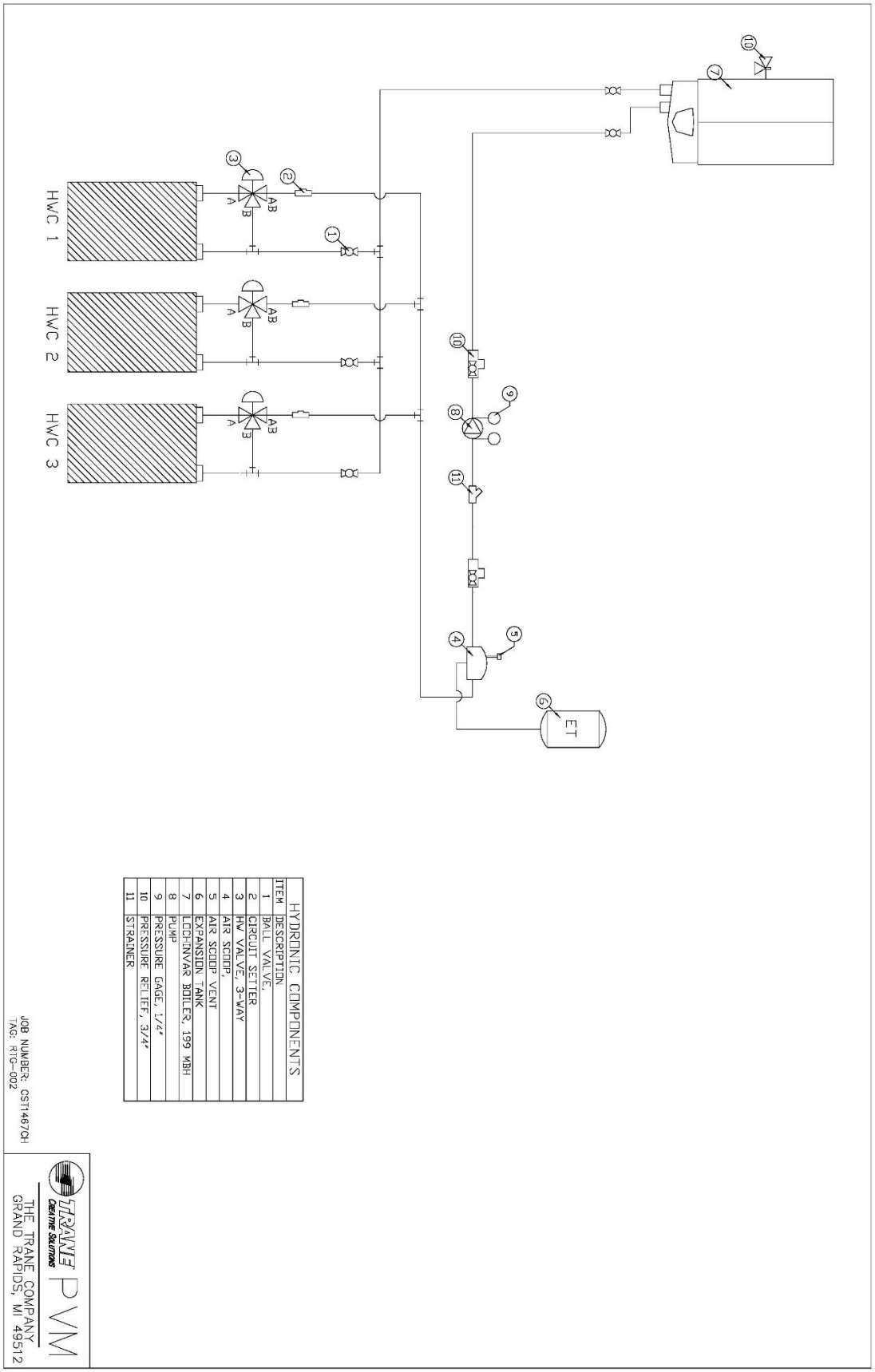
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P&ID Schematic - Packaged Rooftop, Cooling / Heating Units
Item: A1, A3 Qty: 2 Tag(s): RTG-001, RTG-012



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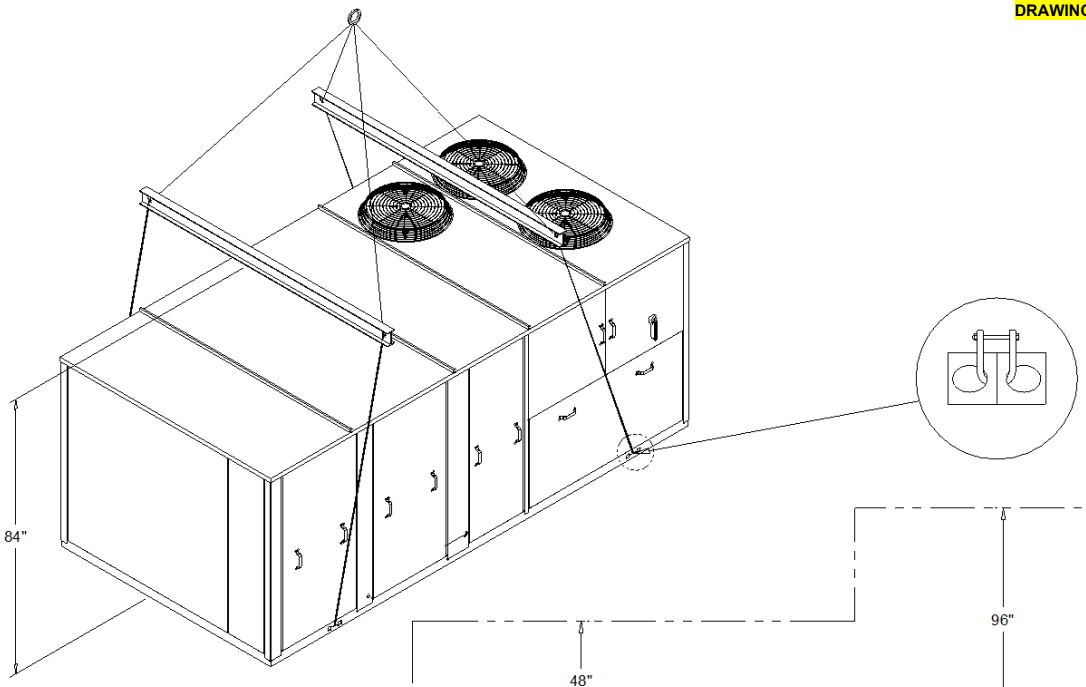
P&ID Schematic - Packaged Rooftop, Cooling / Heating Units
Item: A2 Qty: 1 Tag(s): RTG-002

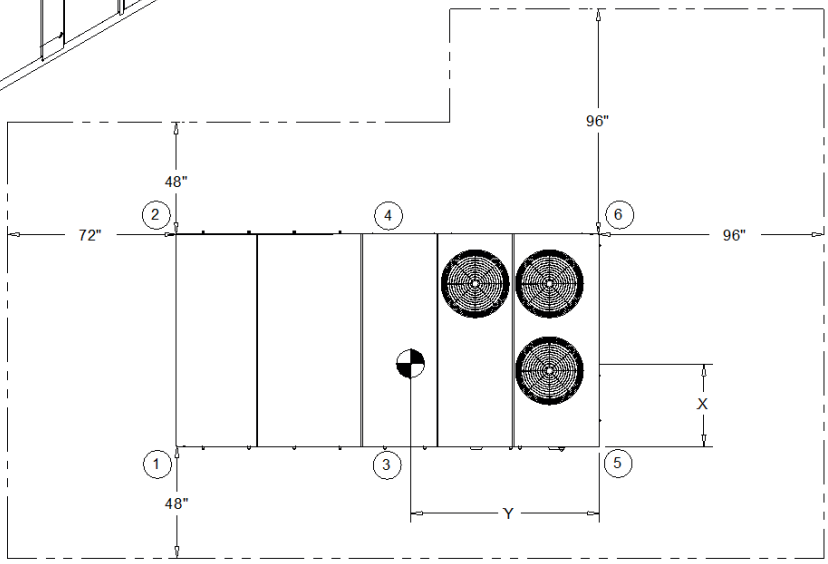


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Weight, Clearance & Rigging - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012

UNIT WEIGHT AND RIGGING DOES NOT INCLUDE CUSTOM PVM BASE. UNIT TO BE ONE PIECE LIFT. SEE LAYOUT DRAWINGS





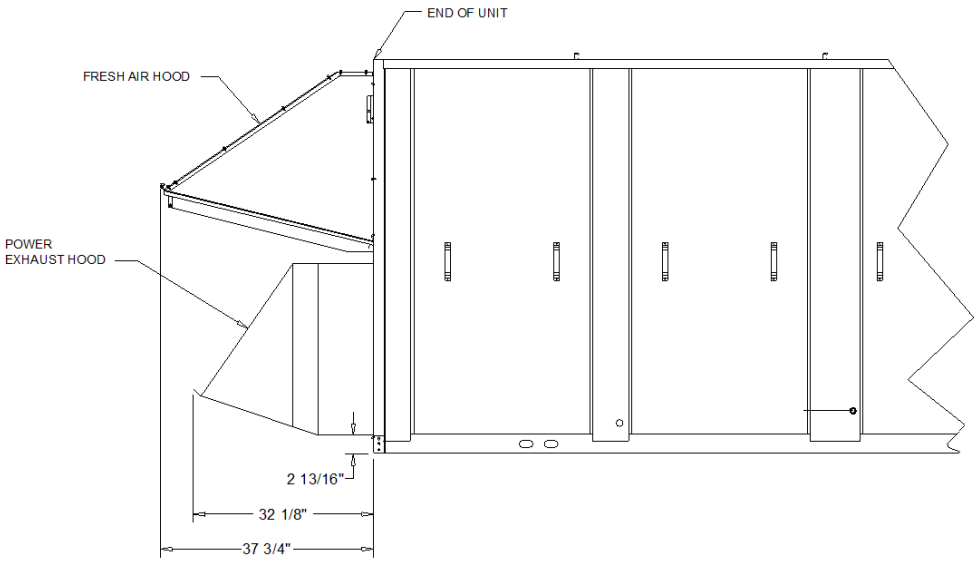
CLEARANCE NOTES:
1. HORIZONTAL AND DOWNFLOW UNITS, ALL SIZES.
2. CONDENSER COIL IS LOCATED AT THE END AND SIDE OF THE UNIT.
3. CLEARANCES ON MULTIPLE UNIT INSTALLATIONS ARE DISTANCES BETWEEN UNITS.
4. ECONO / EXHAUST END MULTIPLE UNITS 144".
5. CONDENSER COIL END/SIDE 192" TO 96"
6. SERVICE SIDE ACCESS 96"

ESTIMATED OPERATING WEIGHT											
OPERATION WEIGHT: 5,128.0 lb											
CENTER OF GRAVITY						OPTIONAL COMPONENTS					
X	43"	Y	77"			POWER EXHAUST		BARO. RELIEF	110.0 lb	SERVICE VALVES	N/A
CORNER LOADING PERCENTS						ECONOMIZER	260.0 lb	THRU-BASE ELECTRICAL	N/A	DISC. SWITCH	N/A
1	2	3	4	5	6	MANUAL DAMPERS	N/A	GFI WITH DISCON. SWITCH	85.0 lb	VFD	85.0 lb
18%	17%	16%	14%	21%	15%	ULTRA LOW LEAK EXH.	N/A	ULTRA LOW LEAK ECON	N/A		
						COIL HAIL GUARD	105.0 lb	MOD. HOT GAS REHEAT	N/A		

WEIGHT NOTES:
1. THE WEIGHT SHOWN REPRESENTS THE TYPICAL UNIT OPERATING WEIGHT FOR THE CONFIGURATION SELECTED. ESTIMATED AT +/- 10 % OF THE NAMEPLATE WEIGHT.
2. THE ACTUAL WEIGHT IS STAMPED ON THE UNIT NAMEPLATE.

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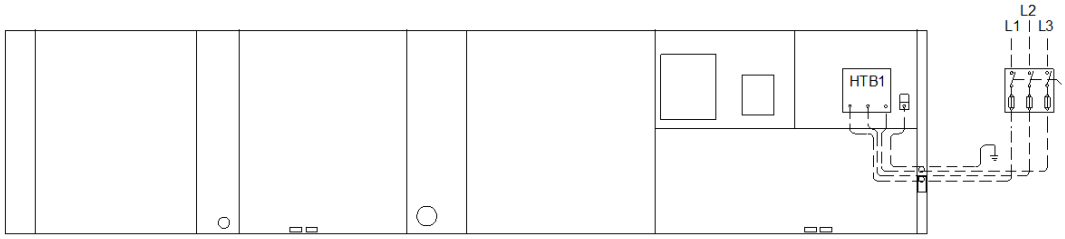
Accessory - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012



FRESH AIR AND POWER EXHAUST HOODS FOR DOWNFLOW RETURN
UNIT DETAIL

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Field Wiring - Packaged Rooftop, Cooling / Heating Units
Item: A1 - A3 Qty: 3 Tag(s): RTG-001, RTG-002, RTG-012



ZONE SENSOR WIRE TABLE

WIRE SIZE	MAXIMUM WIRE LENGTH in
22 GAUGE	1800"
20 GAUGE	3000"
18 GAUGE	4500"
16 GAUGE	7200"
14 GAUGE	11700"

NOTE:
1. All wiring and devices shown dashed to be supplied and installed by the customer in accordance with national and local electrical codes.
2. Low voltage control wiring must not be run in conduit with power wiring.
3. Cut wire jumper adjacent to the terminal 1 on zone sensor.

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SECTION 012000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for permit, municipal surety bonds, and utility connection fee reimbursements.

F. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 005000 - Contracting Forms and Supplements: Forms to be used.

B. Section 005200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.

C. Section 007200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.

D. Section 017800 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Format: Submit required information either in typewritten form or on electronic media printout.
   1. Form is included in Section 006000.
   2. A blank electronic form for electronic media printout is provided on the Owner's electronic document management system - Forms & Standards tab - Project Forms Library table.

B. Forms filled out by hand will not be accepted.

C. Submit initial Schedule of Values within 28 days after date of Owner-Contractor Agreement to Owner's electronic document management system - Project Contracts tab - Submittal .
   1. Owner Review: After review by Owner, revise and resubmit corrected Schedule of Values within 7 days. Continue process until Owner accepts Schedule of Values in conformance with requirements of this section.
   2. Owner will not process Applications for Payment until Schedule of Values is approved.

D. Content: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section.
   1. Include separate line items for each of the following:
      a. Bonds.
      b. Insurance.
      c. General requirements.
      d. Overhead and profit.
      e. Record documents at 3 percent of Contract Sum.
   2. Round off figures to nearest one hundred dollars.
   3. Make sum of total costs of all items listed in Schedule of Values equal to Contract Sum.

E. Revise schedule to list approved Change Orders with each Application For Payment.

1.04 MONTHLY CASH FLOW PROJECTION

1.05 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Format: Submit required information either in typewritten form or on electronic media printout.
   1. Form is included in Section 006000.

2. A blank electronic form for electronic media printout is provided on the Owner's electronic document management system - Forms & Standards tab - Project Forms Library table.

C. Forms filled out by hand will not be accepted.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

G. Submit two copies of each Application for Payment to the Owner.
   1. Transmittal letter as specified for submittals in Section 013000.
   2. Include the following with the application:
      a. Two copies of updated Schedule of Values supporting Application for Payment.
      b. One copy of certified payroll forms for all Contractor and Subcontractor employees working on the Project Site during payment period.
      c. Once copy of construction progress schedule, revised and current as specified in Section 013000.
         1) Alternatively Contractor may submit progress schedule to Owner's electronic document management system - Project Contracts tab - Miscellaneous Documents Table no earlier than 5 days prior to submission of the Application for Payment and include a note stating such with the Application for Payment.
      d. One copy of partial release of liens from major Subcontractors and vendors beginning with second Application for Payment.
      e. Two copies of affidavits attesting to off-site stored products, if any.

H. When Owner requires substantiating information, submit data justifying dollar amounts in question.
   1. Substantiating information shall include actual vendor price quotes to Contractor.

I. Incorrect or incomplete Applications for Payment:
   1. Owner will promptly return to Contractor with a written description of which documents are incorrect or incomplete.
   2. If, in the opinion of the Owner, the incorrectness or incompleteness of the Application for Payment is minor in character, then the Owner will contact the Contractor to discuss the corrections necessary, make the corrections, and send a corrected copy of the Application for Payment to the Contractor to expedite the approval process.

1.06 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or Subcontractors of changes to the Contract Documents.

B. Supplementary Instructions: Owner will issue a supplementary instruction prepared by the Architect for minor changes not involving an adjustment to the Contract Sum or Contract Time.
   1. Supplementary instructions will be issued through the Owner's electronic document management system.
   2. Supplementary instructions will be stored in the Owner's electronic document management system - Project Contracts tab - Supplementary Instructions table for this Project.

C. Owner Initiated Changes: Owner will issue a Change Directive document that includes a detailed description of a proposed change with, if necessary, supplementary or revised drawings and specifications, proposed method of price quotation, and proposed change in Contract Time for executing the change . Contractor shall prepare and submit a price quotation within 7 days.
   1. Execution of Change Directives:

a. Change Directives will be issued through the Owner's electronic document management system.
b. Approved Change Directives will be stored in the Owner's electronic document management system - Project Contracts tab - Change Requests table for this Project.
c. Architect and Contractor shall review the Change Directive and:
1) If in agreement with the proposed methods for changing the Contract Sum or Contract Time, the Architect and Contractor shall approve the Change Directive no later than 2 work days from receipt.
2) If not in agreement with the proposed methods for changing the Contract Sum or Contract Time, Architect or Contractor shall reject the Change Directive and provide reason for the rejection no later than 2 work days from receipt.
3) Owner will reissue Change Directive<> for approval upon conclusion of negotiations to satisfy the reason for the rejection by the Architect or Contractor.
d. Issuance and approval of Change Directive is not an authorization to begin the Work unless the Contract Sum adjustment type is Time & Material.

2. Execution of Proposals in Response to Change Directives:
a. Proposals in response to Change Directives will be issued through the Owner's electronic document management system.
b. Approved proposals will be stored in the Owner's electronic document management system - Project Contracts tab - Claims and Change Directive Response Proposals table for this Project.
c. Contractor shall initiate New Claim or CD Proposal workflow by completing the required fields and attaching supporting documentation for proposal based on proposed method of price quotation and proposed change in Contract Time described in the approved Change Directive.
d. Owner and Architect will review proposal and:
1) If in agreement with the proposal, Owner will approve the proposal, notify Contractor, and initiate Change Order workflow no later than 2 work days from receipt.
2) If not in agreement with the proposal, Owner will reject proposal and provide reason for the rejection no later than 2 work days from receipt.
3) Contractor will resubmit the proposal upon conclusion of negotiations to satisfy the reason for rejection by the Owner or Architect.
4) Owner will review resubmitted proposal and repeat execution steps described previously or cancel Change Directive if negotiations are unsuccessful.

D. Contractor Initiated Changes: Contractor may propose a change by submitting a Claim for change, with a statement describing the reason for the Claim, the effect on the Contract Sum or Contract Time or both, and with full documentation supporting the effect on Contract Sum or Contract Time or both and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
1. Execution of Contractor's Claims:
a. Contractor's Claims will be issued through the Owner's electronic document management system.
b. Approved Claims will be stored in the Owner's electronic document management system - Project Contracts tab - Claims and Change Directive Response Proposals table for this Project.
c. Owner and Architect will review Claim and:
1) If in agreement with the Claim, Owner will approve the Claim, notify Contractor, and initiate Change Order workflow no later than 2 work days from receipt.
2) If not in agreement with the Claim, Owner will reject Claim and provide reason for the rejection no later than 2 work days from receipt.
3) Contractor will resubmit the Claim upon conclusion of negotiations to satisfy the reason for rejection by the Owner or Architect.

4) Owner will review Claim and repeat execution steps described previously or void Claim if negotiations prove Claim is invalid or if negotiations are unsuccessful.

E. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each Claim for additional costs or time with additional information:
      a. Origin of Claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

F. Change Orders: Owner will issue a Change Order document that includes a detailed description of a proposed change with, if necessary supplementary or revised drawings and specifications, proposed change in Contract Sum, and proposed change in Contract Time.
   1. Execution of Change Orders:
      a. Change Orders will be issued through the Owner's electronic document management system.
      b. Approved Change Orders will be stored in the Owner's electronic document management system - Project Contracts tab - Change Orders table for this Project.
      c. Architect and Contractor shall review the Change Order and:
         1) If in agreement with the proposed methods for changing the Contract Sum or Contract Time, the Architect and Contractor shall approve the Change Order no later than 2 work days from receipt.
         2) If not in agreement with the proposed methods for changing the Contract Sum or Contract Time, Architect or Contractor shall reject the Change Order and provide reason for rejection no later than 2 work days from receipt.
         3) Owner will reissue Change Order for approval upon conclusion of negotiations to satisfy the reason for the rejection by the Architect or Contractor.

G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item in order at the end of the schedule and adjust the Contract Sum.

H. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

I. Promptly enter changes in Project Record Documents.

1.07 PERMIT, MUNICIPAL SURETY BONDS, AND UTILITY CONNECTION FEE REIMBURSEMENTS

1.08 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 017000.

END OF SECTION

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 002113 - Instructions to Bidders: Restrictions on timing of substitution requests.

B. Section 013000 - Administrative Requirements: Submittal procedures, coordination.

C. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

D. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. The specified product becomes unavailable through no fault of the Contractor.
      b. The specified product or method of construction cannot be provided within the contract time.
         1) The request will not be considered if the product or method cannot be provided as a result of failure of the Contractor to pursue the Work promptly or coordinate activities properly.
      c. The specified product or method of construction cannot receive necessary approvalby authorities having jurisdiction, and the requested substitution can be approved.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:
   1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. No specific form is required. Contractor's Substitution Request documentation must include the following:
      a. Project Information:
         1) Official project name and number, and any additional required identifiers established in Contract Documents.
      b. Substitution Request Information:
         1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
         2) Indication of whether the substitution is for cause or convenience.
         3) Issue date.
         4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
         5) Description of Substitution.
         6) Reason why the specified item cannot be provided.
         7) Differences between proposed substitution and specified item.
         8) Description of how proposed substitution affects other parts of work.
      c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
         1) Physical characteristics.
         2) In-service performance.
         3) Expected durability.
         4) Visual effect.
         5) Warranties.
         6) Other salient features and requirements.
         7) Include, as appropriate or requested, the following types of documentation:
            (a) Product Data:
            (b) Samples.
            (c) Certificates, test, reports or similar qualification data.
            (d) Drawings, when required to show impact on adjacent construction elements.
      d. Impact of Substitution:
         1) Savings to Owner for accepting substitution.
         2) Change to Contract Time due to accepting substitution.

E. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
   1. Section 002113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

B. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
      b. Other construction by Owner.
      c. Other unanticipated project considerations.

C. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.
   3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

A. Owner and Consultant may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Owner and Consultant will notify Contractor in writing of decision to accept or reject request.
   1. Ownerand Consultant's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document management system.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Subcontractor listing.

G. Construction progress schedule.

H. Progress photographs.

I. Submittals for review, information, and project closeout.

J. Number of copies of submittals.

K. Requests for Information (RFI) procedures.

L. Submittal procedures.

M. Substance abuse testing.

1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Dates for applications for payment.

B. Section 013216 - Construction Progress Schedule: Form, content, and administration of schedules.

C. Section 016000 - Product Requirements: General product requirements.

D. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.

E. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT MANAGEMENT SYSTEM

A. Owner maintains an electronic document management system for the processing and storage of project documentation.

B. Access requirements:

1. To access the electronic document management system effectively Construction Manager shall maintain a minimum of one cable modem internet connection at Construction Manager's office from the Notice to Proceed date through the 1 year warranty period following the Substantial Completion date.
2. The electronic document management system is a web based application and is accessible through the internet with a web browser application.
3. Provide Windows Explorer version 8 or later on computers accessing the document management system as this is the only web browser supported by the system.
4. Owner will provide to the Contractor a maximum of 4 usernames to access the system.

C. Training:

1. Owner will provide an electronic version of the user manual to Construction Manager that instructs the user in a step-by-step basis how to set-up the user's web browser to access the system and to interact with the system.
2. Construction Manager shall be required to attend one two hour training session provided by Owner at Owner's facility.
    a. This requirement will be waived if Construction Manager has prior experience using Owner's electronic document management system.
3. Owner will schedule training session with Construction Manager within 3 days from Notice to Proceed date.
4. Construction Manager attendees:
    a. Project Manager.
    b. Project Superintendent.
    c. Contract representative if different from Project Manager.
        1) Contract representative is emloyee empowered to approve Construction Change Directives and Change Orders.
    d. Project secretary at Construction Manager 's option.

D. Support:
1. Any questions regarding functionality or problems experienced using the electronic document management system shall be directed to the Owner, not the software vendor.

E. Use:
1. The intent is to use the electronic document system for the following:
    a. Submission, review, comment, issuance, and filing of all contractual and technical submittals.
    b. Submission, review, response, issuance, and filing of all requests for information.
    c. Issuance and filing of all Supplementary Instructions.
    d. Submission, review, comment, approval, and filing of all Claims and Construction Change Directive response proposals.
    e. Issuance, approval, and filing of all Construction Change Directives.
    f. Issuance, approval, and filing of all Change Orders.
    g. Submission and filing of Construction Manager's Daily Project Reports.
    h. Preparation and filing of Subcontractor's listing.
    i. Mark-up and filing of record documents.
    j. Issuance, approval, and filing of the Certificate of Substantial Completion and list of items required to be completed for Final Payment.
    k. Submission, issuance, and filing of miscellaneous documents including, but not limited to meeting minutes, telephone conversation confirmations, written correspondence converted to electronic format, photographs, updated progress schedules, and other documents pertaining to the project as required in these specifications.
2. Issuance is defined as notification of document availability on electronice document system for action or review.
3. Owner, Architect, and Construction Manager shall be required to distribute documents to personnel under the respective authority of each that do not have access to the electronic document management system.
4. Approval of documents in the electronic document management system will be legally binding as if they had been signed by the approving party.

3.02 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice to Proceed date.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

4. Contractor's Superintendent.
5. CM Superintendent(s)
6. Major Subcontractors.

C. Agenda:
1. Execution of Owner- Construction Manager Service Order Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Creation of Subontractor list in Owner's electronic document management system, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to the Contract; Owner, Architect, and Contractor .
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.
8. Application for payment procedures.
9. Progress cleaning, waste removal, and waste recovery.
10. Procedures for maintaining record documents.
11. Hazardous materials notification and procedures.
12. Procedures for logging of worker OSHA 10 Hour Construction Safety & Health Training certification.

D. Record minutes and submit within two days after meeting to Owner's electronic document management system as a Miscellaneous Document.
1. Meeting minutes will be stored in Owner's electronice document management system - Project Contracts tab - Miscellaneous Documents table for this Project.

3.03 SITE MOBILIZATION MEETING

A. Owner may schedule a meeting at the Project site prior to Contractor occupancy if warranted by the scope of the Work.

B. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Special consultants.
5. Contractor's superintendent.
6. Major subcontractors.
7. Owner's Tenant Representative.

C. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements and partial occupancy prior to completion.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Protection of existing facilities.
8. Waste removal and waste recovery collection locations.
9. Schedules.
10. Application for payment procedures.
11. Procedures for testing.
12. Procedures for maintaining record documents.
13. Requirements for start-up of equipment.
14. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings between Notice to Proceed and start of the Work at the site at bi-weekly intervals.

B. Schedule and administer meetings throughout progress of the Work at weekly intervals.

C. The Owner reserves the right to lengthen the interval between progress meetings as project requirements dictate.

D. The Owner reserves the right to call for special progress meetings if the Construction Manager is falling behind on schedule or is in non-compliance with Contract requirements.

E. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

F. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Special Consultants as needed.
   5. Contractor's superintendent.
   6. Major Subcontractors as needed.

G. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Schedule
      a. Identification of problems that impede, or will impede, planned progress.
      b. Review of submittals schedule and status of submittals.
      c. Review of RFIs log and status of responses.
      d. Review of off-site fabrication and delivery schedules, if any.
      e. Maintenance of progress schedule.
      f. Corrective measures to regain projected schedules.
      g. Planned progress during succeeding work period.
      h. Coordination of projected progress.
   5. Maintenance of quality and work standards.
   6. Effect of proposed changes on progress schedule and coordination.
   7. Safety and security issues.
      a. Review of worker OSHA 10 Hour Construction Safety & Health Training certification logs status.
      b. Review of hazardous material notification acknowledgement logs status.
   8. Housekeeping and existing facility protection issues.
      a. Waste removal and waste recovery.
   9. Review of record document status.
   10. Other business relating to the Work.

H. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.05 CLOSE-OUT PROGRESS MEETINGS

A. Schedule and administer meetings between Substantial Completion and Final Completion at the Owner's offices at bi-weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Contractor's Superintendent as needed.
   4. Major Subcontractors as needed.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of punch list Work progress.
   3. Field observations, problems, and decisions.
   4. Review of close-out submittals status.
      a. Extended warranties.
      b. Record document completion affidavits.
      c. Hazardous materials acknowledgement signature logs.
      d. OSHA ten hour construction safety training logs.
      e. Refrigerant management forms.
      f. Outstanding technical submittals.
      g. Consent of Surety.
   5. Other business relating to the close-out of the Work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.06 SUBCONTRACTOR LISTING

A. Contractor shall provide a Subcontractor listing not later than 14 days after award of the Contract.

B. The listing will be input and stored in the Owner's electronic document management system - Project Contracts tab - Subcontractor table for this Project.

C. Provide the following information to complete the listing:
   1. Subcontractor company name.
   2. Primary contact name.
   3. Subcontract description identifying the work for which the Subcontractor is responsible.
   4. Subcontractor address.
   5. Telephone, cellular telephone, and facsimile numbers.
   6. Primary contact e-mail address.

3.07 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216

3.08 PROGRESS PHOTOGRAPHS

A. Submit new photographs at least once a month or more often to show progress of the work, within 3 days after being taken.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of work produced by Construction Manager photographer, acceptable to Owner.

D. Views:
   1. Provide non-aerial photographs from various views at each specified time, until date of Substantial Completion.
   2. Consult with Owner for instructions on views required.
   3. Provide factual presentation.
   4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

E. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Owner's document management system as a miscellaneous document.

2. File Naming: Include project identification, date and time of view, and view identification.

3.09 REQUESTS FOR (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Contractor's shall issue the RFI through the Owner's electronic document management system.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract and Section 012000 - Price and Payment Procedures).
      c. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

1. The RFI with response will be stored in the Owner's electronic document management system - Project Contracts tab - RFI's table for this Project.

3.10 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit for Owner and Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Hazardous materials acknowledgement signature logs.
   8. Other types indicated.

B. Submit for Owner's and Architect's review and knowledge in accordance with SUBMITTAL PROCEDURES article below.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
   1. Project record documents completion affidavit for drawings.
   2. Project record documents completion affidavit for specifications.
   3. Operation and maintenance data.
   4. Extended warranties (warranties greater than one year in length).
   5. Compliance with prevailing wage law affidavit.
   6. OSHA ten hour construction safety training log.
   7. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Information: Submit one electronic document to the Owner's electronic document management system.

C. Samples: Deliver the number specified in individual specification sections, but not less than two, under transmittal to the Owner's and Architect's business address; two of which will be retained by the Owner and the Architect respectively.
   1. Submit one electronic document of the delivery transmittal to the Owner's electronic document management system documenting physical sample delivery to Owner and Architect.
   2. After review, produce duplicates.
   3. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Submit to Owner's electronic document management system as a Submittal.
      a. Submittals and sample submittal transmittals will be stored in the Owner's electronic document management system - Project Contracts tab - Submittals table for this Project.
   2. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on submittal.
   3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   4. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. All submittals shall be due with 42 days from Notice to Proceed date unless specifically identified with a different due date in these specifications or under the following exceptions:
         1) The submittal cannot be made until a part of the Work is installed, in which case the submittal shall be made as specifically identified in these specifications, but in no case longer than 21 days from the completion of the installation.
         2) The submittal is a closeout submittal, in which case the submittal shall be made in accordance with the requirements of Section 017800 - Closeout Submittals.
   5. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 14 days excluding delivery time to and from the Contractor.
   6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   7. When revised for resubmission, identify all changes made since previous submission.
   8. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
   9. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   10. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Use of reproductions of the Contract Documents in digital data form to create shop drawings is only permitted with the expressed consent of the Architect under the terms and conditions solely determined by the Architect.
      a. Contractor shall contact the Architect directly to obtain the required permissions.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Owner and Architect will review each submittal and comment on any exceptions, or take other appropriate action.

B. Submittals for Information: Owner and Architect will acknowledge receipt and review. See below for actions to be taken.

C. Owner's and Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and his consultants' actions on items submitted for review or information:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "Reviewed - No Exceptions"
      b. "Reviewed - Exceptions Noted"
         1) Contractor is authorized to proceed only if the review notations are incorporated.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Reviewed - Exceptions Noted - Resubmit"
         1) Submittal is not in compliance with some requirements of the Contract Documents or is lacking information necessary to fully review the submittal.
         2) Resubmit the submittal with revised item or items, with review notations acknowledged and incorporated.
         3) Non-responsive resubmittals may be rejected.
      b. "Reviewed - Rejected"
         1) Submittal is substantially not in compliance with requirements of the Contract Documents.
         2) Submit a new submittal complying with requirements of the Contract Documents.
      c. "Not Reviewed - Not Applicable"
         1) Submittal is not required or is not applicable to the Project.
         2) Submit a new submittal with applicable documentation, if necessary.

3.16 SUBSTANCE ABUSE TESTING

A. Objective:
   1. The objective of this Substance Abuse Testing Program is improved job site safety and morale.
   2. This is not intended as a substitute for the Contractor's or Subcontractors' complete written substance abuse policy that is recommended to include other important features, including an employee education and awareness program, a supervisor training program, and an employee assistance program.

B. Contractual Requirements:
   1. The Contractor shall have and enforce, as a minimum, a written Substance Abuse Program incorporating the testing requirements, terms and conditions set forth in this Substance Abuse Testing paragraph applicable to all its employees and prospective employees in order to be eligible to perform the Owner's work.
      a. The Contractor and all Subcontractors shall comply with this Substance Abuse Testing paragraph.
      b. Suppliers, vendors, and visitors are subject to confirmation of their abstinence from the possession or use of substances indicated in this Substance Abuse Testing paragraph.
   2. Programs which meet the requirements of this Substance Abuse Testing paragraph include:
      a. St. Louis Construction Industry Substance Abuse Consortium.
      b. Unified Drug and Alcohol Testing Policy and Procedure for the Pipefitters Local Union Number 562 and the Mechanical Contractors Association of St. Louis

c. Substance Abuse Testing Program for the Electricians Local Union Number 1 and the National Electrical Contractors Association of St. Louis.
d. Drug and Alcohol Testing Program of the Carpenters' District Council of Greater St. Louis and Vicinity.
e. Drug and Alcohol Testing Program of the Sheet Metal Workers Local Union 36.
f. Eastern Missouri Laborers District Council Substance Abuse Consortium.

3. Submittal to the Owner of written evidence of enrollment in any of the previously listed programs shall satisfy the requirements with regard to pre-engagement and random testing.
4. The Substance Abuse Program will apply to the Contractor and Subcontractors' employees on the Owner's site of construction including workers, new hires, replacements, and supervisory personnel.
5. No employee or prospective employee of a Contractor or Subcontractor will be permitted to work on the Owner's site of construction unless such employee has submitted to testing as required and unless the results of such testing are negative as hereinafter defined.
6. The Contractor and each Subcontractor shall train its employees in methods that will allow them to recognize substance abusers.
7. Supervisory employees of the Contractor or Subcontractor shall be trained to take action, and to confront a substance abuser in a manner consistent with generally accepted training procedures.
8. The Contractor and each Subcontractor shall furnish to the Owner a copy of its Substance Abuse Program for review and acceptance, prior to commencement of the Work on the Owner's site of construction.
9. The costs of implementing the respective Substance Abuse Programs shall be borne by each respective Contractor or Subcontractor.
10. Suppliers, vendors, and visitors shall sign an acknowledgement indicating their abstinence from substance abuse, and their continued avoidance of violations of this paragraph 3.10 at the Owner's site of construction.
    a. The acknowledgement form is in Section - 006000.
11. In the event that an incident/accident occurs and causes the Owner, Contractor, or Subcontractor to believe that substance abuse testing should occur, suppliers, vendors, and visitors agree to submit to a substance abuse screen pursuant to the terms of this Substance Abuse Testing paragraph.
    a. Refusal to submit to substance abuse testing when requested will be grounds for the Owner, Contractor, or Subcontractor to have the supplier, vendor, or visitor permanently barred from the site of construction.

C. Definitions:
1. Positive Tests: Test results indicating the presence of legal or illegal substances at or above the Confirming Limits as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below.
2. Negative Tests: Test results indicating that legal or illegal substances are at levels below the Confirming Limits as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below.
3. Pre-Engagement Testing: Testing for all substances other than alcohol as set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below conducted by the Contractor or Subcontractors for their employees or prospective employees within 120 days prior to their appearance on the Owner's site of Construction.
    a. This requirement will be waived if the employee is an active member of an Owner approved pool.
4. Mandatory Follow-up Testing: Testing for all substances other than alcohol set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the respective Contractor or Subcontractor for their employees at a rate to insure that 100 percent of all workers are tested within a 2 year period.

a. Employees tested under the Random Testing requirements shall have the 2 year period begin with the Random Testing date.

5. Random Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the respective Contractor or Subcontractors for their employees at random times and with a random selection rate of at least 50 percent of Contractors' or Subcontractors' employees annually.
   a. The frequency of Random Testing for a Contractor or Subcontractors' job of less than 1 year will be adjusted proportionately to the duration of the job, but in any event at least one employee per month shall be tested.
   b. Employees selected for random testing shall report to the drug testing laboratory or collection site and provide a specimen the same day that they are notified that they have been selected.
6. For Cause Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the Contractor or Subcontractors for their employees whose behavior on the Owner's site of construction causes either the Owner's or the respective Contractor's or Subcontractors' supervisory personnel to reasonably conclude that such behavior may result from substance abuse.
7. Post-Accident/Incident Testing: Testing for all substances set forth in this Substance Abuse Testing paragraph sub-paragraph E.1 below, conducted by the Contractor or Subcontractors for their employees involved in any accident involving off-site medical treatment or any property damage.
   a. In addition, first aid cases, or “near misses” in which injury or property damage is narrowly avoided may require testing as determined by the Owner, Contractor or Subcontractor.

D. Testing Requirements:
   1. The Contractor or Subcontractor shall perform pre-engagement, mandatory follow-up, random, for cause, and post-accident/incident testing as follows:
      a. Drug Testing:
         1) A screening test (“quickie test”) may be performed on-site or at an approved testing facility, using a Food and Drug Administration (FDA) approved device for instant testing.
            (a) Persons with negative tests will be allowed to start work immediately.
            (b) Persons testing non-negative will not be allowed to begin work pending confirmation via the standard test.
            (c) If a screening test is used, specimens shall be collected and submitted for testing per this Substance Abuse Testing paragraph, sub-paragraph D.1.a.2) below.
            (d) Upon approval, a device from the approved listing provided by the Department of Transportation (DOT) may also be used.
         2) Standard drug testing must be conducted by a SAMHSA (Substance Abuse Mental Health Services Administration) certified laboratory with test results interpreted by a licensed medical review officer (MRO).
      b. Alcohol Testing:
         1) The initial screen tests for alcohol shall be performed by using either a saliva test or a breathalyzer test comparable to the type used by law enforcement officials.
         2) Alcohol confirmatory tests shall be performed by using either a blood alcohol test or a breathalyzer test comparable to the type used by law enforcement officials.
   2. Evidence of Testing:

a. Evidence of the negative test results of individual employees (the identity of employees testing positive shall be kept confidential) shall be furnished to the Owner, prior to commencement of work by the employer or individual employee and promptly after performance of any subsequent testing required by this this Substance Abuse Testing paragraph, in the form of:
   1) Electronic databases, all negative test results shall be included in an electronic database that will be accessible to employers and Owners. The database will include the employee's name, craft, identification number, and the date of the test.
   2) A certificate not older than 120 calendar days prior to the Notification To Proceed for pre-employment testing, signed by the testing laboratory, setting forth the nature and results of tests performed, including the employee's name, identification number, craft, and the date of the test.
   3) An identification card, signed by the respective Contractor or Subcontractor and issued to the individual employee, setting forth employee's name, and the date, nature and results of testing as reported on a certificate issued by the testing laboratory, the name of which shall also appear on the identification card; provided the affected employee authorized the issuance of such identification card.
   4) Documentation not older than 120 calendar days that the Contractor or Subcontractor is enrolled in an approved program identified in this Substance Abuse Testing paragraph, sub-paragraph B.2.
   5) Documentation not older than 120 calendar days of Contractor or Subcontractor company program that specifically identifies compliance with the requirements of this Substance Abuse Testing paragraph and encompasses 100 percent mandatory participation by Contractor or Subcontractor employees.

E. Threshold Limits:
   1. Under the five-panel test, the minimum substance abuse testing requirements for the following substances are:

SUBSTANCE	THRESHOLD LIMIT	GC/MS CONFIRMING LIMIT
Alcohol	0.04%	0.04%
Amphetamines	1,000 ng/ml	500 ng/ml
Cocaine Metabolites	300 ng/ml	150 ng/ml
Marijuana Metabolites	50 ng/ml	15 ng/ml
Opiate Metabolites	2,000 ng/ml	300 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml

   2. The Owner will accept, although not required, ten-panel tests in lieu of five-panel tests. Under the ten-panel test, the minimum substance abuse testing requirements for the following substances are:

SUBSTANCE	THRESHOLD LIMIT	GC/MS CONFIRMING LIMIT
Alcohol	0.04%	0.04%
Amphetamines	1,000 ng/ml	500 ng/ml
Cocaine Matabolites	300 ng/ml	150 ng/ml
Marijuana Metabolites	50 ng/ml	15 ng/ml
Opiate Metabolites	2,000 ng/ml	300 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml
Barbiturates	300 ng/ml	200 ng/ml
Benzodiazepines	300 ng/ml	200 ng/ml
Methadone	300 ng/ml	200 ng/ml
Methaqualone	300 ng/ml	200 ng/ml

Propoxyphene	300 ng/ml	200 ng/ml

3. Additionally, minimum-testing requirements for “Drugs of Choice” may be established on an individual job site basis. “Drugs of Choice” are defined as substances, in addition to the basic list set forth above, that may be found to be in significant use. If implemented, the Owner will pay for the additional testing.

F. Compliance Procedure:
1. The Owner reserves the right to audit any Substance Abuse Program to verify compliance results within twenty-four (24) hours of the Owner's notification of intent to audit, and the Owner shall have free right of access to all relevant records of the Contractor and its Subcontractors and suppliers for this purpose, provided such record disclosures are within the scope of the Department of Health and Human Services (DHHS) guidelines pertaining to confidentiality of employee records.
2. The Contractors' or Subcontractors' employees who receive a positive test result shall immediately leave the Owner's site of construction.
3. The Contractors' or Subcontractors' employees who receive a confirmatory positive test result shall be prohibited from returning to any of the Owner's sites of construction until such time that said employee has successfully completed an assessment/substance abuse treatment program as submitted by the employer that is acceptable to the Owner, but no sooner than 60 days, tests negative, and if said employee agrees to submit to substance abuse testing, without prior notice, at least 1 time per quarter (with dated certificates), for at least 3 years from the date of return or the duration of the Contract, whichever is less.

G. Cooperation and Review:
1. The Contractor's Substance Abuse Program (and the Substance Abuse Programs of its Subcontractors) shall be furnished to the Owner for review prior to starting the Work on site. The Owner reserves the right to review and have the Contractor's or Subcontractors' Substance Abuse Program amended prior to acceptance.
2. The Contractor or Subcontractors shall provide the Owner with a monthly summary report of Program compliance.
3. The requirements of this program related to post accident/incident testing after an injury or accident and for cause testing may be met through implementation of the Contractor's program. However, the Owner reserves the right in any circumstance to require that Contractor or Subcontractor employees be tested for cause or after an injury or accident.

H. Submittals:
1. Submit to Owner as a single Submittal.
2. Submittal will be stored in the Owner's electronic document management system in the Contractor's Contracts Page in the Contract Submittals table for this Project.
3. Substance abuse company policies for Contractor and all Subcontractors as one submittal package.
4. Substance abuse evidence of testing as required by this Substance Abuse Testing paragraph sub-paragraph D.2 for Contractor and all Subcontractors as one submittal package.
5. Submit no later than 28 days from Notice to Proceed date but prior to beginning the Work on site.
6. For Contractor and Subcontractor employees that are added to workforce after initial submittal and are not in an approved program identified in this Substance Abuse Testing paragraph, sub-paragraph B.2 or an approved Contractor or Subcontractor program, submit evidence of testing as an electronic document attached to an e-mail prior to employee beginning the Work on site.

3.17 CONTRACTUAL SUBMITTAL SUMMARY

A. Section 005200 submittals:
1. Agreement Between Owner and Contractor

a. Submit 2 signed originals.
b. Submit no later than 7 days after receipt of Agreement from Owner.

B. Section 007200 submittals:
1. Performance and Payment Bonds
a. Submit 1 signed original.
b. Submit within 14 days of Notice To Proceed in the amount requested by the Owner.
c. Submit within 14 days of the anniversary date of the Agreement in the amount requested by the Owner.
2. Certificates of Insurance
a. Submit 1 copy.
b. Submit no later than 7 days after receipt of Agreement from Owner.
c. Submit no later than 7 days after any change in coverage.
3. Asbestos Notification Acknowledgement Forms
a. Submit 1 copy.
b. Submit form signed by all workers that will be working on the Project prior to beginning the Work.
c. Submit updated form with signatures appended to original signed form whenever additional workers are to be added to the workforce on the Project.

C. Section 012000 submittals:
1. Applications for Payment
a. Submit 2 copies of partial or final Applications for Payment for each Work Order.
b. Signed by a corporate officer.
c. Final Application for Payment is due no later than 30 days after the Work Order is completed.
2. Certified Payrolls
a. Submit 1 copy.
b. Submit with each partial or final Application for Payment for each Work Order.
c. Submit Contractor and Subcontractors certified payrolls on forms accepted by the Missouri Department of Labor for employees working on the Work Order for which the Application for Payment is made.
3. Prevailing Wage Compliance Affidavit
a. Submit 1 copy.
b. Submit with final Application for Payment for each Work Order.
4. Partial Lien Waivers
a. Submit 1 copy.
b. Submit with each partial Application for Payment for each Work Order beginning with the second partial Application for Payment.
c. Partial lien waivers are required from the Contractor and each Subcontractor.
5. Final Lien Waivers
a. Submit 1 copy.
b. Submit with final Application for Payment for each Work Order.
c. Final lien waivers are required from the Contractor and each Subcontractor.

D. Section 013000 submittals:
1. Preconstruction, Site Mobilization, and Progress Meeting Minutes
a. Submit 1 copy.
b. Submit no later than 2 days after meeting.
2. Permits
a. Submit 1 copy.
b. Submit no later than 7 days after receipt of the permit from the authority having jurisdiction.
3. Product Data, Shop Drawings, Samples, Certificates, Manufacturer's Instructions, Manufacturer's Fied Reports, and Erection Drawings

a. Submit 1 electronic copy or 2 copies plus quantity required to be returned to Contractor.
b. Submit when required in individual specification sections or where indicated on drawings and at appropriate times to meet construction schedule.

4. Contractor and Subcontractor Substance Abuse Policies
   a. Submit 1 copy.
   b. Submit no later than 28 days from Notice to Proceed date but prior to beginning the Work on site for Contractor and each Subcontractor.
5. Contractor and Subcontractor Substance Abuse Evidence of Testing
   a. Submit 1 copy.
   b. Submit no later than 28 days from Notice to Proceed date but prior to beginning the Work on site for Contractor and each Subcontractor.

E. Section 014100 submittals:
1. Immigration Documentation Certification
   a. Submit 1 copy.
   b. Submit prior to beginning any of the Work.
2. OSHA Ten Hour Construction Safety Training Log
   a. Submit 1 copy.
   b. Submit form completed for all workers that will be working on the Project prior to beginning the Work.
   c. Submit updated form with new workers appended to original form whenever additional workers are to be added to the workforce on the Project.

F. Section 016000 submittals:
1. Product Substitution Request
   a. Submit 1 copy.
   b. Submit when applicable.
2. Value Engineering Proposal
   a. Submit 1 copy.
   b. Submit when applicable.

G. Section 017419 submittals:
1. Waste Disposal Reports
   a. Submit 1 copy.
   b. Submit with final Application for Payment.

H. Section 017800 submittals:
1. Record Drawings
   a. Submit 2 copies.
   b. Submit with final Application for Payment.
2. Operations and Maintenance Manuals
   a. Submit 2 copies.
   b. Submit with final Application for Payment.

END OF SECTION

SECTION 013216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

1.02 RELATED SECTIONS

A. Section 011000 - Summary: Work sequence.

B. Section 013000 - Administrative Requirements: Submittals and distribution of schedule.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements.

B. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

C. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

D. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

E. Within 10 days after joint review, submit complete schedule.

F. Submit updated schedule with each Application for Payment.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with three years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

B. Contractor's Administrative Personnel: three years minimum experience in using and monitoring CPM schedules on comparable projects.

1.06 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 24 x 36 inches.

C. Sheet Size: Multiples of 8-1/2 x 11 inches.

D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate phases and stages and other logically grouped activities.

D. Provide sub-schedules for each stage of Work identified in Section 011000 - Summary.

E. Provide sub-schedules to define critical portions of the entire schedule.
   1. Identify start-up and testing activity for major equipment or systems.
   2. Identify building automation systems activity after installation of major equipment or systems.
   3. Identify testing and balancing activity associated with generation or preliminary report and separately for generation of final report if testing and balancing reports are required as part of project scope of work.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the report data day of each report.

G. Identify submittal dates for shop drawings, product data, and samples, owner-furnished products, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

H. Indicate delivery dates for owner-furnished products.

I. Coordinate content with schedule of values specified in Section 012000 - Price and Payment Procedures.

J. Provide legend for symbols and abbreviations used.

K. Include weather days allowance as identified in the General Conditions as part of critical path.

3.03 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 14 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
      a. Changes to the Work which can be performed during float time shall not be considered a delay and therefore shall not cause a change to the Substantial Completion Date.
   11. Percentage of activity completed.
   12. Responsibility.

D. Analysis Program: Capable of accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups if network diagram is incapable of graphically identifying the relationships between activities and the critical path:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.

3. Listing of activities on the critical path.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Owner and Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Update diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties as required in Section 013000.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 013553
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: use of premises and occupancy.

B. Section 015000 - Temporary Facilities and Controls: Temporary lighting.

1.03 SECURITY PROGRAM

A. Protect Work , existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

B. Initiate program in coordination with Owner's existing security system at project mobilization.

C. Maintain program throughout construction period until Owner occupancy.

1.04 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workers and visitors, make available to Owner on request.

D. Owner will control entrance of persons and vehicles related to Owner's operations.

1.05 SECURITY IDENTIFICATION

A. Provide identification badge to each person authorized to enter premises.

B. All Contractor or Subcontractor employees working on the Project site will be required to obtain security identification badges before coming to the Project site.

C. **Failure of the Contractor or Subcontractor to enforce these security identification procedures may lead to a ban on future work with the Owner in addition to notices of non-performance.**

D. Badges may be obtained Monday through Friday after contacting the Parkway School District Security/Badging Office (Logan Gnade) at 314-415-8262, and making an appointment. The Parkway School District Security/Badging office is located at the Parkway School District Welcome Center at South Middle School, 760 Woods Mill Road, Manchester, Missouri 63011.

E. To obtain a security identification badge, the Contractor or Subcontractor employee shall be required to give their full name, present personal identification verifying their name (e.g., driver's license), give their employer's company name, and present documentation verifying their employment with the company (e.g., business card, identification letter on company letterhead, etc.).
   1. During normal working hours, employment confirmation may be made by a confirming telephone call to the company.

F. Security identification badge must be kept with the Contractor or Subcontractor employee and prominently displayed while they are on the Project site.
   1. The Contractor or Subcontractor employee shall prior to or immediately upon arriving at the project site to begin their work, report to the Contractor's Superintendent to present the their security identification badge and shall record the badge number on the Security Badges & OSHA 10 Hour Training Log form provided by the Contractor.
   2. The security identification badge may be temporarily removed from prominent display if the security identification badge will pose a safety threat to the Contractor or Subcontractor employee as the employee carries out the Work.

3. If the Contractor or Subcontractor employee temporarily removes the security identification badge from prominent display for safety purposes, the Contractor or Subcontractor employee shall promptly present the security identification badge to any employee of the Owner that requests to see the security identification badge.

G. Failure to promptly present the security identification badge shall be grounds for instant removal of the Contractor or Subcontractor employee from the Project site until the security identification badge can be presented.

H. If the Contractor or Subcontractor employee fails to present the security identification badge a second time, the Owner will request the Contractor or Subcontractor employee to be removed from the Project site permanently.

I. Require return of badges at expiration of their employment on the Work.

1.06 SUBMITTALS

A. Owner's Standard Security Badges & OSHA 10 Hour Training Log Form is in Section 006000 - Project Forms.

B. Submit a copy of the Owner's Standard Security Badges & OSHA 10 Hour Training Log required under paragraph 1.05.F.1 of this Section prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

1.07 RESTRICTIONS

A. Do not allow cameras on site or photographs taken except by written approval of Owner.

B. Do not work prior to 6:00 a.m. or after 11:00 p.m. Monday through Friday within enclosed facility without prior approval of Owner.

C. Do not work on site or on exterior of facility outside of times allowed by local municipality or county ordinance.

D. Do not work on Saturdays, Sundays, or holidays without prior approval of Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. References and standards.

C. Inspection agencies and services.

D. Control of installation.

E. Mock-ups.

F. Tolerances.

G. Owner's required inspections.

H. Manufacturers' field services.

I. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 007200 - General Conditions: Inspections and approvals required by public authorities.

B. Section 013000 - Administrative Requirements: Submittal procedures.

C. Section 014216 - Definitions.

D. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Owner's and Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's and Architect's information.

C. Test Reports: After each test/inspection, promptly submit one electronic copy of report to Construction Manager and to Owner's electronic document management system.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Owner or Architect, provide interpretation of results.
   2. Test report submittals are for Owner's and Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's and Architect's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Owner's electronic document management system.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

2. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner and Architect.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Owner's and Architect's benefit as contract administrator or for Owner's and Architect's information.
1. Submit report within 14 days of observation to Owner's electronic document management system for Owner's and Architect's information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

G. Erection Drawings: Submit drawings for Owner's and Architect's benefit as contract administrator or for Owner's and Architect's information.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection unless specifically indicated in individual specification sections to be the responsibility of the Contractor.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Architect to evaluate quality of the mock-up.

E. Notify Architect and Owner seven (7) working days in advance of dates and times when mockups will be constructed.

F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within two (2) working days of initial review and each subsequent follow up review of each mockup.
   2. Make corrections as necessary until Architect's approval is issued.

J. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

L. Where possible salvage and recycle the demolished mock-up materials.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Owner, Architect, and Contractor of observed irregularities or non-conformance of Work or products.
   6. Perform additional tests and inspections required by Owner or Architect.
   7. Attend preconstruction meetings and if request by Owner attend progress meetings.
   8. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Owner and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Owner.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 CONSTRUCTION MANAGER REQUIRED INSPECTIONS

A. Owner requires inspections by Contractor 's personnel prior to execution of parts of the Work that will close off the Work from future inspection.

B. Contractor shall notify the Owner telephonically and directly (voice mail not allowed) at least 24 hours in advance of performing the Work requiring inspections by Owner.

C. If Contractor begins the Work requiring inspections by the Owner prior to the expiration of the 24 hour notification period, Owner will require Contractor to uncover the Work at Contractor's cost.

D. Contractor may proceed with the Work requiring inspections by the Owner upon expiration of the 24 hour notification period whether the Owner has representatives on site or not.

E. The following Work requires inspections by the Owner:

1. All underground utilities prior to backfilling.
2. All underground utility trenches prior to backfilling over tracer warning tape.
3. All aggregate base courses prior to placement of asphalt or concrete surfaces.
4. All final graded areas prior to installation of sod or seeding.
5. All segmental block retaining walls prior to backfilling courses below grade.
6. All segmental block retaining walls prior to backfilling first level of geo-grid reinforcement.
7. Spaces above ceilings before hanging support grids.
8. Walls containing sanitary sewer, storm sewer, water, fire sprinkler, heating water supply or return, and any other piping conveying liquid under gravity flow or pressure flow prior to enclosing the wall on both sides.
9. Walls containing sanitary vent, natural gas, compressed air, pneumatic control and any other piping or tubing conveying gaseous material prior to enclosing the wall on both sides.
10. Prior to conducting any pressure tests on systems.
11. All roof curbs prior to installing mechanical equipment on the curbs.
12. All mechanical equipment to be installed on roof curbs prior to installing on the curbs.
13. All electrical cable splices prior to installing equipment or covers over the electrical cable splices

3.06 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, and training as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Owner's electronic document management system 30 days in advance of required observations.
   1. Observer subject to approval of Architect.
   2. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements at Contractor's cost.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 014100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Owner regulatory requirements.

B. County, Municipality, and Fire District regulatory requirements.

C. State regulatory requirements.

D. Federal regulatory requirements.

1.02 OWNER

A. No Tobacco Use Policy:
   1. Owner has adopted a tobacco free site policy.
   2. No tobacco products may be used in the Owner's facilities or on the Owner's grounds.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

B. No Firearms Policy:
   1. Owner has adopted a firearms free site policy.
   2. No firearms may be brought in the Owner's facilities or on the Owner's grounds.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

C. Alcohol and Controlled Substances Policy:
   1. Owner has adopted a alcohol and controlled substance free site policy.
   2. No alcohol or controlled substances may be brought in the Owner's facilities or on the Owner's grounds.
      a. Exception: Controlled substances prescribed by a doctor specifically for the use of the Contractor or Subcontractor employee in the original prescription container will be allowed.
   3. Any Contractor or Subcontractor employee discovered violating this policy may be required to leave the Project site and may not be allowed to return to the Project.

1.03 COUNTY, MUNICIPALITY, AND FIRE DISTRICT

A. Regulatory requirements applicable to this project are the following:

B. 29 CFR 1910 - Occupational Safety and Health Standards.

C. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.

D. ADA Standards - 2010 ADA Standards for Accessible Design.

E. County of St. Louis amendments to some or all of the following.

F. Municipality where the Project is located amendments to some or all of the following.

G. Zoning Code: St. Louis County or Municipality where the project is located.

H. ICC (IBC) - International Building Code.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities.

J. ICC (IBC) - ICC International Existing Building Code, 2009.

K. IAPMO (UPC) - Uniform Plumbing Code.

L. ICC (IFGC) - International Fuel Gas Code.

M. ICC (IMC) - International Mechanical Code.

N. NFPA 70 - National Electrical Code.

O. Elevator Code: State of Missouri and County of St. Louis.

P. ICC (IECC) - International Energy Conservation Code.

Q. Erosion and Sedimentation Control Regulations:Most recent edition adopted by Authority Having Jurisdiction, including all applicable amendments and supplements.

1.04 STATE

A. Prevailing Wage Law:
   1. Contractor and Subcontractors shall comply with the requirements of this paragraph 1.04 and Section 290.220 RSMo which provides that "a wage of no less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, shall be paid to all workers employed by or on behalf of any public body engaged in public works exclusive of maintenance work."
   2. Contractor shall forfeit to the Owner the sum of One Hundred Dollars ($100.00) for each worker employed, for each calendar day, or portion thereof such worker is paid less than the said stipulated rates for any work done under this Contract, by the Contractor or by any Subcontractor to the Contractor.
   3. Contractor shall include provisions in all bonds to guarantee the faithful performance of the prevailing wage requirements specified herein.
   4. Contractor shall post in a prominent and easily accessible place at the Project Site during the full time that any worker shall be employed on the Project a clearly legible statement of all prevailing hourly wage rates to be paid to all workers employed in order to execute the Contract and perform the Work.
   5. Owner may request from time to time certified copies of Contractor's payroll to ascertain if Contractor is in compliance.
   6. Contractor shall execute an affidavit stating compliance with the prevailing wage law upon completion of the Project and before final payment request.
      a. The affidavit form is in Section 006000 - Project Forms.
   7. The Contractor and each Subcontractor shall maintain accurate records pertaining to wages paid all workers employed on the Project within the State of Missouri for a period of not less than 1 year following Final Acceptance by Owner.
   8. Wage Rate Determination for this Project is attached following this section.
   9. Submittals:
      a. Contractor will execute an affidavit stating compliance with the prevailing wage law upon completion of the project and before final payment request.
      b. The affidavit form is in Section 006000 - Project Forms.
      c. Submit affidavit form prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

B. Construction Safety Training Law:
   1. Contractor and Subcontractors shall comply with the requirements of 1.04 and Section 290.220 RSMo which provides that "any Contractor for any public body for purposes of construction of public works and any Subcontractor to such Contractor shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program [the program] for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the department [of labor] which is at least as stringent as an approved OSHA program, unless such employees have previously completed the required program".
   2. Contractor and Subcontractors shall require all on-site workers to complete the ten-hour training program or such employees must hold documentation of prior completion of the program.
      a. Contractor shall require every on-site worker to report to the Contractor's Project Superintendent and produce documentation of successful completion of the program upon the on-site worker's first day working on the Project Site.

b. Contractor shall maintain a log of on-site workers that includes the worker's name, worker's signature, date worker began work on Project Site, company name employing worker, and training certification number on Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log Form .
c. Contractor and Subcontractors shall require all on-site workers to carry documentation of successful completion of the program at all times while working on Project Site and present the documentation to the Owner's Representative when requested.

3. Contractor and Subcontractors shall require all on-site workers who have not previously completed the program to complete the program within sixty calendar days of beginning work on the Project.
   a. Any on-site worker who cannot produce documentation of successful completion of the program as required by paragraph 1.04.B.2 of this Section shall produce documentation of successful completion of the program within twenty calendar days of the initial request to present documentation.
   b. Any on-site worker who fails to present the documentation of successful completion of the program within twenty calendar days shall be removed from the Project until such time as the on-site worker can present the documentation of successful completion of the program.
4. Contractor shall forfeit as a penalty to the Owner two thousand five hundred dollars ($2,500.00) plus one hundred dollars ($100.00) for each employee employed by the Contractor or Subcontractor for each calendar day, or portion thereof, such employee is employed without the required training.
   a. The penalty will not begin to accrue until the time period in paragraphs 1.04.3 and 1.04.3.a of this Section have elapsed.
   b. Owner will withhold and retain therefrom all sums and amounts due and owing as a result of any violation of Section 292.675 RSMo when making payments to the Contractor under the Contract.
   c. Contractor may withhold from any Subcontractor sufficient sums to cover any penalties the Owner has withheld from the Contractor resulting from the Subcontractor's failure to comply with the terms of this Section.
      1) If the Contractor has made payment to the Subcontractor without withholding, the Contractor may recover from the Subcontractor the amount of the penalty resulting from the fault of the Subcontractor in an action maintained in the circuit court in the county in which the Project is located.
5. Submittals:
   a. Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log Form is in Section 006000 - Project Forms.
   b. Submit a copy of the Owner's Standard OSHA 10 Hour Construction Safety & Health Training Log required under paragraph 1.04.B.2.b of this Section prior to submitting Final Application for Payment or no later than 42 days from Substantial Completion, whichever comes first.

1.05 FEDERAL

A. Immigration Documentation:
   1. The Immigration Reform and Control Act of 1986 (“IRCA”) requires all U.S. employers to verify the employment eligibility and identity of all employees as of November 6, 1986.
      a. This includes the verification of the individual's identity and work eligibility.
      b. The IRCA makes it unlawful for United States employers to knowingly hire or continue to employ unauthorized workers.
      c. Whether the illegal employment is intentional or merely due to an oversight or lack of knowledge, the employer may still be subject to fines as defined by the Department of Homeland Security.
   2. Employer Responsibility:

a. It is the employer's responsibility to ensure that the appropriate documentation is provided to every new employee hired after November 6th, 1986.
b. There are stiff penalties for not being able to provide Form I-9 for all employees upon request.
c. The employer has the right to refuse the employee their job if they are unable to furnish the required documents.
d. There are certain exceptions as to who Form I-9 is applicable for, such as independent contractors, employees hired from employment agencies, and employees hired before November 7, 1986.

3. Penalties for non compliance with Form I-9:
   a. Employers who fail to properly complete, retain, or make I-9 Forms available for inspection, face fines ranging from one hundred dollars ($100.00) to one thousand one hundred dollars ($1,100.00) per individual I-9.
   b. For employers who knowingly hire or knowingly continue to employ unauthorized workers, civil penalties range from two hundred fifty dollars ($250.00) to eleven thousand dollars ($11,000.00) per violation.
   c. For employers engaging in a pattern or practice of knowingly hiring or continuing to employ unauthorized workers, criminal penalties can be as much as three thousand dollars ($3,000.00) per unauthorized employee and/or 6 months of imprisonment.
4. Employee Responsibility:
   a. Even though the employer is responsible for providing a newly hired employee with Form I-9, the new employee must still complete Section 1 of Form I-9 by the end of the first day of work to be in compliance with the IRCA.
   b. In the event that the company is not aware of this legal requirement, it is strongly recommended that any new employee provide the employer with Form I-9 to ensure that his or her new workplace is in compliance with federal regulations.
5. Genuineness of work eligibility and identity documents:
   a. The employer must review the genuineness of the documents provided the employee. Employers may encounter the following two scenarios:
      1) A document accepted is not genuine
      2) The document accepted is genuine but does not belong to the person that provided it
   b. The employer can refuse to accept a document that does not appear to be genuine.
   c. If the prospective new employee cannot provide an acceptable document, he or she should not be allowed to continue to work.
6. Submittals:
   a. Contractor and Subcontractors shall submit a letter on their respective company letterhead, signed by authorized representative of the Contractor or Subcontractor is in compliance with the IRCA and that I-9 forms and supporting documentation are on file as required.
   b. Submit certification within 28 days from Notice to Proceed date but prior to beginning the Work on Project Site.

B. Refrigerant Management:
   1. Under Section 608 of the CAA, EPA has established regulations (40 CFR Part 82, Subpart F) that:
      a. Require service practices that maximize recovery and recycling of ozone-depleting substances (both chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) and their blends) during the servicing and disposal of air-conditioning and refrigeration equipment.
      b. Set certification requirements for refrigerant recycling and recovery equipment, technicians, and refrigerant reclaimers.
      c. Restrict the sale of refrigerant to certified technicians.

d. Require persons servicing or disposing of air-conditioning and refrigeration equipment to certify to EPA that they have acquired refrigerant recovery and/or recycling equipment and are complying with the requirements of the rule.
e. Require the repair of substantial leaks in air-conditioning and refrigeration equipment with a refrigerant charge greater than 50 pounds.
f. Establish safe disposal requirements to ensure removal of refrigerants from goods that enter the waste stream with the charge intact (e.g., motor vehicle air conditioners, home refrigerators, and room air conditioners).

2. Contractor shall complete an Owner's Standard Contractor Information and Licensing Input Form and identify all technicians that will work on equipment that uses a refrigerant.
   a. All technicians must carry a “Universal” class refrigerant technician license.
   b. Photocopies of each technician's license shall be attached to the Owner's Standard Contractor Information and Licensing Input Form.
3. Contractor shall complete an Owner's Standard Equipment Removal/Installation Input Form for each piece of equipment that uses a refrigerant removed as part of the Work.
4. Contractor shall complete an Owner's Standard Equipment Removal/Installation Input Form for each piece of equipment that uses a refrigerant installed as part of the Work.
5. Contractor shall complete an Owner's Standard Service Order Form for each removal or addition of refrigerant for each piece of equipment.
6. Disposition of Refrigerant:
   a. Contractor shall turn over all removed refrigerant to the Owner in containers conforming to DOT and EPA requirements and in good condition.
   b. Refrigerant containers shall be tagged with the name of the Contractor, the Owner's Project number, the Owner's equipment number, and the type of refrigerant in the container.
   c. Refrigerant will remain the property of the Owner.
   d. The Owner will contact the Contractor after refrigerant is transferred to Owner's storage containers to arrange time for Contractor to retrieve Contractor's refrigerant containers.
   e. Deliver refrigerant containers to the Owner at the District Operations Building, 363 North Woods Mill Road, Chesterfield, Missouri 63017, between the hours of 8:00 a.m. and 3:00 p.m. Monday through Friday.
   f. Notify Owner forty-eight hours in advance of delivery; obtain receipt from Owner at time of delivery.
7. Submittals:
   a. Contractor's transmittal form documenting delivery date, type of refrigerant, and quantity of refrigerant delivered to Owner.
   b. The following forms to be used are in Section 006000 - Project Forms:
      1) Owner's Standard Contractor Information and Licensing Input Form: submit within 28 days from Notice to Proceed date but prior to beginning the Work on Project Site.
      2) Owner's Standard Equipment Installation/Removal Input Form: submit all equipment forms as one submittal package prior to Substantial Completion date.
      3) Owner's Standard Service Order Form: submit all service order forms for removing, addiing, or accidental venting of refrigerant as one submittal package prior to Substantial Completion date.

1.06 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements.

1.07 QUALITY ASSURANCE

A. Contractor's Designer Qualifications: Refer to Section - 014000 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 33

Section 100
ST. LOUIS COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2026**

Last Date Objections May Be Filed: **April 9, 2026**

Prepared by Missouri Department of Labor and Industrial Relations

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$72.26
Boilermaker	$44.93*
Bricklayer - Stone Mason	$65.89
Carpenter	$69.38
Lather	
Linoleum Layers & Cutter	
Millwright	
Pile Driver	
Cement Mason	$61.40
Plasterer	
Communication Technician	$67.84
Electrician (Inside Wireman)	$79.41
Electrician (Outside Lineman)	$44.93*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Elevator Constructor	$106.30
Glazier	$71.63
Iron Worker	$75.80
Laborer	$58.92
Laborer - First Semi-Skilled	
Laborer - General	
Laborer - Second Semi-Skilled	
Laborer - Skilled	
Mason	$57.31
Marble Finisher	
Marble Mason	
Terrazzo Finisher	
Terrazzo Worker	
Tile Finisher	
Tile Setter	
Operating Engineer	$76.62
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group III - A	
Operating Engineer - Group IV	
Operating Engineer - Group V	
Painter	$57.67
Plumber	$83.99
Pipe Fitter	
Roofer/WaterProofer	$62.13
Sheet Metal Worker	$78.63
Sprinkler Fitter - Fire Protection	$88.12
Truck Driver	$44.93*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

*** The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.**

ST. LOUIS COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$70.28
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$77.51
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Laborer	$59.45
Laborer - General	
Laborer - Skilled	
Operating Engineer	$76.52
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group IV	
Truck Driver	$40.45
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance iwth the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title shown on the Building Construction Rate Sheet.

***The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.**

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 014216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Contract: Same as Agreement.

B. Furnish: To supply, deliver, unload, and inspect for damage.

C. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

D. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

E. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

F. Provide: To furnish and install.

G. Supply: Same as Furnish.

H. Other Secification Sections

1. Approve: The term "approved," where used in conjunction with the Owner's Representative's action on the Contractor's submittals, applications, and requests, is limited to the responsibilities and duties of the Architect stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.
2. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Owner's Representative", "requested by the "Owner's Representative", and similar phrases. However, no implied meaning shall be interpreted to extend the Owner's Representative's responsibility into the Contractor's area of construction supervision.
3. Furnish: The term "furnish" is used to mean, "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."
4. Foreman: This is the Contractor's Representative at the work site. This person will generally be the Competent Person required by OSHA in 29 CFR 1926.
5. General Superintendent: This is the Contractor's Representative supervising multiple project sites or on large scale project. This person may be the Competent Person required by OSHA in 29 CFR 1926.
6. Indicated: This term refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
7. Install: 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."
8. Installer: An "installer" is an entity engaged by the Contractor, either as an employee, subcontractor or sub subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

9. Owner's Representative: This is the entity described as the "Architect" in AIA Document A201 "General Conditions of the Contract for Construction." All references to Architect or Engineer in the Contract Documents in all cases refer to the Owner's Representative. The Owner's Representative will represent the Owner during construction and until final payment is due. The Owner's Representative will advise and consult with the Owner. The Owner's instructions to the Contractor will be forwarded through the Owner's Representative.
10. Project Administrator: This is the entity described as the "Project Representative" in AIA Document A201 "General Conditions of the Contract for Construction," or is the entity described as "Engineer" in Engineers Joint Contract Document Committee (EJCDC) Document 1910-8 "Standard General Conditions of the Construction Contract." The Project Administrator is a full time representative of the Owner at the job site with authority to stop the work upon verbal order if requirements of the Contract Documents are not met, or if in the sole judgment of the Project Administrator, Owner's Representative, Owner, the interests of the Owner, safety of any person or the Owner's property are jeopardized by the work. The Project Administrator is different from the position of Owner's Representative as used in these documents, the latter having more limited authority in general and specifically not having authority to stop the work.
11. Project Site is the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project.
12. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
13. Regulation: The term "Regulations" includes laws, statutes, ordinances, patents, royalties and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the Work, whether they are lawfully imposed by authorities having jurisdiction or not.
14. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.+

1.03 ASSIGNMENT OF SPECIALISTS

A. This Specification requires that certain specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and the assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

B. This requirement should not be interpreted to conflict with enforcement of building codes or regulations governing the work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

C. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.

B. Referenced industry standards take precedence over standards that are not referenced but recognized in the construction industry as applicable.

C. Unreferenced industry standards are not directly applicable to the work, except as a general requirement of whether the work complies with recognized construction industry standards.

D. Publication Dates: Where compliance with an industry standard is required, comply with standard in effect as of date of execution of the work.

E. Updated Standards: At the request of the Owner, Contractor may submit a Change Order proposal where applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected. The Owner will decide whether to issue a Change Order to proceed with the updated standard.

F. Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Owner for a decision before proceeding.

G. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, as appropriate for the context of the requirements. Refer instances of uncertainty to the Owner for decision before proceeding.

H. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entities' construction activity. Copies of applicable standards are not bound with the Contract Documents.

I. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

J. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Owner reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

K. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the Specifications or other Contract Documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers and enclosures.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

I. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 013553 - Security Procedures

B. Section 015100 - Temporary Utilities.

C. Section 015500 - Vehicular Access and Parking.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.04 TEMPORARY UTILITIES - SEE SECTION 015100

1.05 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and printer.
   2. Telephone Land Lines: One line, minimum; one handset per line.
      a. Land line requirement will be waived if Contractor's Superintendent has dedicated cellular telephone.
   3. Internet Connections: Minimum of one; DSL modem or faster.
      a. If Contractor is allowed to use Owner's existing facility for a field office, then Contractor may access Owner's internet connection at no cost to Contractor.

1.06 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.07 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and plywood or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces as indicated on drawings.
   1. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.09 SECURITY - SEE SECTION 013553

1.10 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500

1.11 WASTE REMOVAL

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically as containers are filled.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on drawings.

B. Erect on site at location indicated.

C. No signs are allowed without Owner permission except those required by law.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 015100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity and water.

1.02 RELATED REQUIREMENTS

A. Section 015000 - Temporary Facilities and Controls:
   1. Temporary telecommunications services for administrative purposes.
   2. Temporary sanitary facilities required by law.

1.03 TEMPORARY ELECTRICITY

A. Cost: By Owner.

B. Connect to Owner's existing power service.
   1. Do not disrupt Owner's need for continuous service.
   2. Exercise measures to conserve energy.

C. Provide temporary electric feeder from existing building electrical service at location as directed.

D. Power Service Characteristics: TBD volt, TBD ampere, three phase, four wire.

E. Complement existing power service capacity and characteristics as required.

F. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

G. Provide main service disconnect and over-current protection at convenient location .

H. Permanent convenience receptacles may be utilized during construction.

I. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY VENTILATION

A. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.05 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source.
   1. Exercise measures to conserve water.
   2. Provide separate metering and reimburse Owner for cost of water used.

D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 015500
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access roads.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Flag persons.

G. Flares and lights.

H. Haul routes.

I. Traffic signs and signals.

J. Maintenance.

K. Removal, repair.

L. Mud from site vehicles.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: For access to site, work sequence, and occupancy.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Construction: Contractor's option.

2.02 SIGNS, SIGNALS, AND DEVICES

A. Stock Post Mounted and Wall Mounted Traffic Control and Informational Signs:

B. Traffic Control Signals: As approved by local jurisdictions.

C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

D. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS ROADS

A. Use of existing on-site streets and driveways for construction traffic is permitted.

B. Tracked vehicles not allowed on paved areas.

C. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.

D. Location as approved by Architect.

E. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

F. Provide and maintain access to fire hydrants and control valves free of obstructions.

3.03 PARKING

A. Use of designated areas of existing parking facilities by construction personnel is permitted.

B. Use of designated areas of new parking facilities by construction personnel is permitted.

C. Arrange for temporary parking areas to accommodate use of construction personnel.

D. When site space is not adequate, provide additional off-site parking.

E. Locate as approved by Architect.

3.04 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.05 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.06 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.07 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.08 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Relocate as work progresses, to maintain effective traffic control.

3.09 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.

B. Maintain existing and new permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.10 REMOVAL, REPAIR

A. Remove temporary roads when permanent paving is usable.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Repair existing facilities damaged by use, to original condition.

D. Remove equipment and devices when no longer required.

E. Repair damage caused by installation.

F. Remove post settings to a depth of 2 feet.

3.11 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Value engineering proposals

G. Procedures for Owner-supplied products.

H. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. 011010 - Project Summary - Bid Packages: Lists of products to be removed from existing building.

B. 011010 - Project Summary - Bid Packages: Identification of Owner-supplied products.

C. Section 014000 - Quality Requirements: Product quality monitoring.

D. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

E. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

F. Section 220513 - Common Motor Requirements for Plumbing Equipment: Motors for plumbing equipment.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See 011010 for list of items required to be salvaged for reuse and relocation.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made of wood from newly cut old growth timber.
   2. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 016116.
   2. If wet-applied, have lower VOC content, as defined in Section 016116.
   3. Are extracted, harvested, and/or manufactured closer to the location of the project.
   4. Have longer documented life span under normal use.
   5. Result in less construction waste. See Section 017419
   6. Are made of vegetable materials that are rapidly renewable.
   7. Are made of recycled materials.
   8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
   9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
   10. Are Cradle-to-Cradle Certified.
   11. Have a published Environmental Product Declaration (EPD).
   12. Have a published Health Product Declaration (HPD).
   13. Have a published Manufacturer's Inventory of Chemical Content.

D. Provide interchangeable components by the same manufacture for components being replaced.

E. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

F. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Owner; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. No substitutions will be considered after award of the Contract except as follows:
   1. The specified product becomes unavailable through no fault of the Contractor.

2. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure of the Contractor to pursue the Work promptly or coordinate activities properly.
3. The specified product or method of construction cannot receive necessary approval by authorities having jurisdiction, and the requested substitution can be approved.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the Contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure (after contract award):
1. Submit to Owner and Architect one electronic copy of request for substitution as a Request For Information in Owner's document management system for consideration.
2. Limit each submittal to one value engineering proposal.
3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
4. The Architect will notify Contractor in writing of decision to accept or reject request.
5. If accepted, a Change Order will be issued to document the acceptance of the substitution request.

3.02 VALUE ENGINEERING PROPOSALS

A. Value engineering proposals shall be substitutions which, if accepted, provide a savings to the Project of at least two thousand five hundred dollars ($2,500.00) or more after deducting offsetting costs the Owner may be required to bear. Offsetting costs to the Owner may include increased administrative costs by the Owner, Architect's fees for incorporating proposal into Construction Documents, increased cost of other construction by the Owner, cost of Owner's other contractors, and similar considerations.

B. Value engineering proposals will be considered at any time after award of the Contract.

C. Owner is under no obligation to accept value engineering proposals from Contractor.

D. Owner is under no obligation to reimburse costs of value engineering proposal preparation to Contractor if proposal is rejected.

E. The amount of savings to the Project after deducting offsetting costs to the Owner will be distributed fifty percent to the Owner and fifty percent to the Contractor.

F. Value Engineering Proposal Submittal Procedure:
1. Submit to Owner and Architect one electronic copy of value engineering proposal as a Request For Information into Owner's document management system for consideration.
2. Limit each submittal to one value engineering proposal.
3. Submit narrative describing value engineering proposal, product information, and cost savings analysis.
4. The Owner will notify Contractor in writing of decision to accept or reject request.
5. If accepted, a Change Order will be issued to document the acceptance of the value engineering proposal and modify the Contract Sum accordingly.

3.03 OWNER-SUPPLIED PRODUCTS

A. See Section 011010 011010 - Project Summary - Bid Packages for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.04 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.05 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.

J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 016116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures.

B. Section 014000 - Quality Requirements: Procedures for testing and certifications.

C. Section 016000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Flooring.
   4. Composite wood.
   5. Products making up wall and ceiling assemblies.
   6. Thermal and acoustical insulation.
   7. Other products when specifically stated in the specifications.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Other products when specifically stated in the specifications.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

F. CHPS (HPPD) - High Performance Products Database.

G. CRI (GLP) - Green Label Plus Testing Program - Certified Products.

H. GreenSeal GC-03 - Anti-Corrosive Paints; Green Seal, Inc.; 2007

I. GreenSeal GS-11 - Paints; Green Seal, Inc.; 1993.

J. GreenSeal GS-36 - Standard for Adhesives for Commercial Use.

K. SCAQMD 1113 - Architectural Coatings.

L. SCAQMD 1168 - Adhesive and Sealant Applications.

M. SCS (CPD) - SCS Certified Products.

N. UL (GGG) - GREENGUARD Gold Certified Products.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.06 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
   1. Wet-Applied Products: State amount applied in mass per surface area.
   2. Paints and Coatings: Test tinted products, not just tinting bases.
   3. Evidence of Compliance: Acceptable types of evidence are the following;
      a. Current UL (GGG) certification.
      b. Current SCS (CPD) Floorscore certification.
      c. Current SCS (CPD) Indoor Advantage Gold certification.
      d. Current listing in CHPS (HPPD) as a low-emitting product.
      e. Current CRI (GLP) certification.
      f. Test report showing compliance and stating exposure scenario used.
   4. Product data submittal showing VOC content is NOT acceptable evidence.
   5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.
      b. Published product data showing compliance with requirements.
      c. Certification by manufacturer that product complies with requirements.

C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
      b. Report of laboratory testing performed in accordance with requirements.
      c. Published product data showing compliance with requirements.
      d. Certification by manufacturer that product complies with requirements.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
   1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
   2. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Aerosol Adhesives: GreenSeal GS-36.
   3. Joint Sealants: SCAQMD 1168 Rule.
   4. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).

D. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 014000 - Quality Requirements: Testing and inspection procedures.

C. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.

D. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.

E. Section 015100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

F. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

G. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

H. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

I. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Notify Owner in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate contractor.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

D. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes.
   2. Outdoors: Limit conduct of especially noisy exterior work to local municipality or County ordinances.
   3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am unless approved by Owner prior to performing noisy work.

E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

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

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Owner will locate and protect survey control and reference points.

D. Control datum for survey is that established by Owner provided survey.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.
   2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.

2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
   3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
   4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:

1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect waste materials, debris, and trash/rubbish and place in appropriate trash receptacles or dumpsters daily.

E. Compliance failure:
   1. Owner shall give Contractor written notice of failure to comply with progress cleaning and waste removal requirements.
   2. Owner shall commence progress cleaning and waste removal requirements with Owner's own forces if Contractor has not complied within 24 hours after receiving notice.
   3. Owner shall back charge Contractor at the rate of $80 per man hour required to bring site to a clean and orderly condition.

3.09 PROTECTION OF EXISTING FACILITIES

A. Protect adjacent rooms and spaces that are not a part of the Work.

B. Contractor shall shut doors and keep closed.

C. Contractor shall seal off with plastic and tape inside the Work area any smoke detectors, communicating wall penetrations, return registers, and door undercuts during operations that will generate airborne dust and debris.

D. Contractor shall maintain plastic barriers until the Work generating airborne dust and debris is completed.

E. Contractor shall remove plastic barriers carefully to not damage existing facilities.

F. Contractor shall not use spray adhesives to attach plastic.

G. Contractor shall use tape that will not damage material adhered to upon tape removal.

H. Protect existing flooring:
   1. Prior to Contractor mobilization on site:
      a. Contractor shall provide contact adhesive plastic on carpeted flooring in any room or space, including stairs and ramps that are part of the Work or are used for storage and as indicated on the drawings.
      b. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over contact adhesive plastic sheeting on carpeted flooring and 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic sheeting on vinyl tile, sheet vinyl, wood, ceramic tile, quarry tile, porcelain tile, rubber, or poured resin flooring in corridors or any other heavy traffic area, including stairs and ramps used to move wheeled or skidded equipment or materials and as indicated on the drawings.
      c. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic sheeting on vinyl tile, sheet vinyl, wood, ceramic tile, quarry tile, porcelain tile, rubber, or poured resin flooring in any rooms or spaces that are part of the Work or are used for storage.
      d. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood in areas where soldering, metal cutting, pipe threading, welding, or torch work is performed.
      e. Contractor shall tape all joints on installed 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood and maintain taped joints throughout progress of the Work to insure joints remained sealed and do not pose a tripping hazard.
      f. Contractor shall cooperate with Owner to identify spaces that meet the requirements for flooring protection identified in this Section prior to mobilization on site.
   2. During construction:
      a. Contractor will maintain flooring protection during progress of the Work and will not remove protection until all the Work in the room or space is substantially complete.
      b. If Contractor moves into a new space to perform the Work or to use for storage and does not protect the existing floor, then the Contractor shall be back charged for cleaning flooring at a minimum or replacement of flooring at a maximum, dependent upon damage to flooring and at the sole discretion of the Owner.

I. Protect existing casework:
   1. Contractor shall cover with plastic and tape as a minimum.
   2. Contractor shall provide 1/4 inch tempered masonite, 3/8 inch masonite, or 1/4 inch plywood over plastic if casework is used as a ladder or scaffold for workers or if soldering, metal cutting, pipe threading, welding, or torch work is performed overhead.
   3. Maintain during progress of the Work and do not remove until all the Work in the room or space is substantially complete.

J. Compliance failure:
   1. Owner shall give Contractor written notice of failure to comply with protection of existing facilities.
   2. Owner shall commence protecting existing facilities with Owner's own forces if Contractor has not complied within 24 hours after receiving notice.
   3. Owner shall back charge Contractor at the rate of $80 per man hour plus cost of protection materials required to protect existing facilities.
   4. Contractor shall repair to the satisfaction of the Owner or replace casework damaged as a consequence of using casework as a ladder or scaffold for workers or if damaged because soldering, metal cutting, pipe threading, welding, or torch work is performed overhead without specified protection.

3.10 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.11 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.12 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.13 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 230593 - Testing, Adjusting, and Balancing for HVAC.

3.14 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Replace filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.15 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Owner when work is considered ready for Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Owner will occupy portions of the building as specified in Section 011000.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Accompany Owner's Construction Supervisor on Contractor's preliminary final inspection.

I. Notify Owner when work is considered finally complete.

J. Complete items of work determined by Architect's and Owner's final inspection.

END OF SECTION

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Owner recovers commodity, universal, and hazardous waste materials.

C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. Minimize trash/waste disposal in landfills; salvage or recycle as much waste as economically feasible.

E. Required Recycling: The following must be recycled by the Contractor:
   1. Wood pallets, not painted.
   2. Clean dimensional wood, not painted.
   3. Land clearing debris, including brush, branches, logs, and stumps; see 311000 - Site Clearing for use options.
   4. Concrete.
   5. Concrete masonry units.
   6. Bricks, unless specifically identified in the Contract Documents to be re-used on site.
   7. Pre-cast concrete panels.
   8. Asphalt.
   9. Asphalt roofing shingles.
   10. Plumbing fixtures, porcelain.
   11. Acoustical ceiling tile:
      a. Use acoustical ceiling tile recycling program administered by Armstrong World Industries, Inc.
         1) Additional information can be found at web address ***https://www.armstrongceilings.com/commercial/en-us/performance/sustainable-building-design/ceiling-recycling-program.html***
      b. Materials acceptable for recycling:
         1) All brands of dry, pulpable mineral fiber ceiling panels or tiles.
            (a) All metal splines must be removed from tiles (12”x12”).
         2) All brands of dry fiberglass panels (foil-back case by case).
            (a) Facing must be easily removable.
         3) Any vinyl or scrim-faced mineral fiber panels.
      c. Materials acceptable for recycling case-by-case: (Contact the Armstrong Recycling Center at telephone number 877-276-7876)
         1) Asbestos containing ceiling tiles, Ceiling tiles installed below friable asbestos or contaminated with any other hazardous material.
         2) Red or pink-backed ceiling tiles.
         3) Wet, moldy or weathered ceiling tiles.
         4) Ceiling tiles or pallets/boxes/bales which contain visible debris (garbage, construction waste).
         5) Ceiling tiles not packaged according to Armstrong Specifications.
         6) Any gypsum ceiling or board.
         7) Ceiling tiles with visible wood pulp.
         8) Armstrong Artran (cardboard like face).
         9) Armstrong Ceramaguard.
         10) Glue-up or adhesive ceiling tiles.
         11) Roll-offs which contain debris.
         12) Baled fiberglass, vinyl-faced, fabric, scram faced or foil-backed ceiling tiles.

d. Call the Armstrong Recycling Center at 877-276-7876 to review the building where the ceilings will be removed, verify the material meets our requirements and for assistance to facilitate recycle. We are continually updating the types of ceiling panels we can recycle and methods we can receive them in.
e. Ceiling material being reclaimed may not come into contact with asbestos containing material, hazardous waste materials or special waste.
    1) If the area where ceilings are being removed is or has gone through abatement procedures, verification that ceilings did not come in contact with asbestos containing material is required
f. Ceiling material being reclaimed must be kept dry and free from debris.
g. Contractor shall register the Project: Contact the Armstrong Ceiling Recycling Center at telephone number 877-276-7876.
h. Required Information to have project approved for recycling:
    1) Contact information for the recycle project.
    2) Building information (Year of Building Construction, Contractor or demo subontractor, Building use, copy of an asbestos survey, details on any prior or current abatement where ceiling is removed).
        (a) Owner will provide asbestos survey information upon request from the Contractor.
    3) Ceiling Information – Material type, quantity, timing.
i. Scheduling, packaging, and shipping procedures:
    1) Receive final project approval for recycling by the Armstrong Recycling Center.
    2) Contractor shall remove ceiling tiles to be recycled from grid.
    3) Contractor shall contact the Armstrong Recycling Center (877-276-7876) to schedule a pick up.
    4) Contractor shall use one of the following three options for return.
        (a) When Option B or C is chosed by the Contractor, coordinate with the local recyler/consolidator for the applicable option to be used.
    5) Option A For Return-Full Truckload Palletized Procedure:
        (a) Contractor shall supply pallets, metal bands, stretch wrap.
        (b) Approved ceiling materials will be palletized in a manner allowing both secure shipment by trailer and the ability of Armstrong employees to safely inspect and unload the trailers' contents, therefore all approved ceiling materials sent to Armstrong must be neatly stacked as follows:
            (1) 4’ x 4’ pallets stacked with ceiling materials to 4 feet tall each and then stacked on top of each other in the trailer. This method is preferred but proper loading equipment must be available at the job site.
            (2) 4’ x 4’ pallets stacked with ceiling materials to 6 feet tall each.
            (3) Some combination of 2’x4’ and 4’x4’ pallets that are agreed upon in advance, in writing to accommodate special building circumstances if building elevators do not accommodate larger size pallets.
            (4) When 2’ x 4’ pallets are used place onto 4’ x 4’ pallets to stabilize two 2’ x 4’ pallets and use stretch wrap to secure pallets together..
        (c) Contractor shall neatly stack ceiling panels on 4’ x 4’ wooden pallets and secure them with metal bands or stretch wrap for stable shipment.
            (1) Any variation from pallet size must be pre-approved by Armstrong.
        (d) Pallets must be kept dry.
            (1) Wet material is not acceptable and will be returned.
        (e) Pallets must be labeled per Armstrong requirements.
        (f) Pallets must be secured within trailers to prevent shifting in transit.
            (1) Carriers will provide load stabilizers.
        (g) Armstrong will pay for the return freight of full trailers of approved material, all of which are defined as a minimum of 30,000 square feet as follows:

(1) Forty-four 4’ x 4’ pallets stacked with ceiling material to 4 feet tall each and then stacked on top of each other in the trailer (preferred method, but proper loading equipment must be available at the job site).
(2) Twenty-two 4’ x 4’ pallets with ceiling material stacked to 6 feet tall each.

(h) It is Contractor's responsibility to ensure that only full trailer loads of approved ceiling materials are shipped.

6) Option B For Return-Less Than Full Truckload Palletized Procedure:
(a) Where the amount of approved ceiling materials from a site is insufficient for a full trailer load, the Contractor may elect to utilize the services of a local recycler/conconsolidator to consolidate approved ceiling materials in a secure and dry location, until a full trailer load is ready for shipment.
(1) The local recycler/consolidator will ensure that all such aggregated shipments are and remain clearly labeled as to their origin and date of approval by an Armstrong employee.
(2) Go to following web address to find a local recyler/consolidator: ***www.armstrongceilings.com/commercial/enus/performance/sustainable-building-design/ceiling-recyclingprogram.html***.
(3) Upon aggregating a full truck load of ceiling tiles, follow the Option A procedures.

(b) The local recycler/consolidator may assist in supplying pallets, metal bands, and stretch wrap.
(c) When local consolidation is not available a LTL pick up may be arranged in some areas for five (5) pallets (7,000 sq. ft.) or more of approved ceiling materials.
(1) Armstrong will pay the return freight of these LTL pickups. LTL pickup must be pre-approved by Armstrong when other options are not available.
(2) LTL pickup must be pre-approved by Armstrong when other options are not available.

(d) The recycler/consolidator shall retain ownership of approved ceiling materials until it is received and accepted at the destination, the Armstrong Plant, as defined by the terms of shipment, F.O.B. (Free on board) destination, despite Armstrong’s payment of the freight costs for full trailer loads.
(e) While the Armstrong approved common carrier is not a party to this agreement, the following describes their responsibilities.
(1) The common carrier that Armstrong has selected is responsible for the transport of the approved ceiling materials from the pick up location to Armstrong’s plant.
(2) This common carrier is an independent contractor utilized by Armstrong and required to demonstrate general liability insurance coverage that meets or exceeds industry standards.

7) Option C For Return-On-Site Roll-Off Procedure (Bulk return to local recycler/consolidator):
(a) Where the amount of approved ceiling materials from a site is insufficient for a full trailer load, the Contractor may elect to utilize the services of a local recycler/conconsolidator to consolidate approved ceiling materials in a secure and dry location, until a full trailer load is ready for shipment.
(1) The local recycler/consolidator will ensure that all such aggregated shipments are and remain clearly labeled as to their origin and date of approval by an Armstrong employee.

(2) Go to following web address to find a local recyler/consolidator: ***www.armstrongceilings.com/commercial/enus/performance/sustainable-building-design/ceiling-recyclingprogram.html.***
(3) Upon aggregating a full truck load of ceiling tiles, follow the Option A procedures.
(b) Material must be clean and dry.
(c) No wood, metal, construction debris, trash or hazardous materials of any kind can be included.
(d) Material shall be placed in a roll-off container with a water impermeable cover such that material inside does not get wet.
(e) Material shall not be loaded above the top of the container.
(f) Container should have visible Armstrong RA label attached.

12. Contractor can find contact information for various material recyclers at the following web addresses, but may use the material recycler of their choosing, whether or not they are listed at the web addresses provided:
    a. ***http://www.stlouisco.com/HealthandWellness/RecyclingandWasteManagement/RegulationsAndLicensing/ConstructionAndDemolitionRecycling***

F. Required Recycling: The following must be disposed of in Owner provided containers or stockpiled in areas identified by Owner on project site for Owner pick-up for recycling or disposal:
1. Single Stream Recycling Container:
    a. Aluminum and plastic beverage containers.
    b. All nonhazardous aluminum containers.
    c. All nonhazardous glass containers.
    d. All nonhazardous plastic containers marked with the number 1, 2, 3, 4, 5, or 7.
        1) Plastic containers marked with the number 6, plastic bags, plastic straps, and plastic container lids shall not be recycled but shall be disposed of off site.
    e. All nonhazardous cardboard free of contaminants with the exception of metal staples or tape.
2. Ferrous Scrap Metal Recycling Container:
    a. All nonhazardous ferrous metals, including packaging banding, metal studs, acoustic ceiling tile frames, sheet metal, structural steel, conduit not containing copper or aluminum wire, piping, reinforcing bars, doors without glazing, door frames, door hardware, and other items made of steel, iron, galvanized steel, stainless steel.
3. Non-Ferrous Scrap Metal Recycling Container:
    a. All nonhazardous non-ferrous metals, including acoustic ceiling tile frames, sheet metal, conduit which can contain copper or aluminum wire, piping, plumbing fixture trim components, doors without glazing, door frames, door hardware, and other items made of aluminum, copper, zinc, lead, brass, and bronze.
    b. All electrical cabling and wiring.
4. Stockpile For Owner Recycling Or Hazmat Disposal:
    a. Mechanical and electrical equipment, unless otherwise indicated on the drawings.
        1) Refrigerant shall be removed from mechanical equipment before recycling mechanical equipment.
    b. Fluorescent lamps (light bulbs).
        1) Protect lamps from breakage during demolition, collection, and stockpiling
    c. All lead acid NiCad and lithium batteries.
    d. All lighting ballasts or other electrical equipment suspected of containing PCBs.

G. The Owner's waste minimization and material recovery operation is limited to those commodity, universal, and hazardous waste materials identified above as Owner's responsibility and responsibility for disposal or recycling of all other construction and demolition waste shall be the responsibility of the Contractor.

H. Owner will recycle recyclable materials and legally dispose of hazardous materials collected from the commodity, universal, and hazardous waste materials identified above as Owner's responsibility.

I. Revenue from recycling of materials collected from the commodity, universal, and hazardous waste materials identified above as Owner's responsibility shall accrue to the Owner.

J. Revenue from recycling of materials collected from the commodity, universal, and hazardous waste materials identified above as Contractor's responsibility shall accrue to the Contractor.

K. Develop and follow a Waste Management Plan designed to implement these requirements.

L. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.
   5. Incineration, either on- or off-site.

M. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.

B. Section 013000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. Section 015000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 016000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 017000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

F. Section 311000 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Waste Management Plan:
   1. Submit Report prior to starting the Work on Project Site but no later than 42 days after Notice To Proceed date.
   2. Submit to Owner one electronic copy of waste disposal report as an e-mail attachment containing the following information:
      a. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed.
      b. Landfill Alternatives: List all waste materials that will be diverted from landfills by salvage or recycling.
         1) List each material proposed to be salvaged or recycled.

C. Waste Disposal Reports:
   1. Submit Report prior to submitting Final Application for Payment but no later than 28 days after Substantial Completion date.
   2. Submit to Owner one electronic copy of waste disposal report as an e-mail attachment containing the following information:
      a. Landfill Disposal: Include the following information:
         1) Identification of material.
         2) Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
         3) Provide the name, address, telephone number, and contact person's name of the landfills used and provide certification to the Owner that the landfills have been used.
         4) Include manifests, weight tickets, receipts, or invoices as evidence of quantity.
      b. Recycled and Salvaged Materials: Include the following information for each:
         1) Does not apply to Owner recycled materials.
         2) Identification of material, including those retrieved by installer for use on other projects.
         3) Amount, in tons or cubic yards, date removed from the project site, and receiving party.
         4) Include manifests, weight tickets, receipts, and invoices as evidence of quantity.
         5) Certification by receiving party that materials will not be disposed of in landfills or by incineration.
      c. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 011000 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.

D. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.

E. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman and each Subcontractor.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings, particularly at:
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to Subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Extended Warranties.

1.02 RELATED REQUIREMENTS

A. Section 007200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Extended warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents Affidavits:
   1. Owner's Standard Affidavits of Record Document Completion is in Section 006000 - Project Forms.
   2. Submit to Owner and Architect one electronic copy of Owner's Standard Affidavits of Record Document Completion as a Submittal into Owner's document management system prior to submittal of Final Application for Payment but no later than 28 days after Substantial Completion date.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within 10 ten days after acceptance.
   2. Compile all operation and maintenance data for each Section and submit as one submittal for each Section.
   3. Submit to Owner and Architect one electronic copy of operation and maintenance data for each Section as a Submittal into Owner's document management system as required in paragraph 1.03.B.1 but no later than 42 days after Notice to Proceed.
   4. The submittal will be reviewed and returned with Owner's and Architect's comments or it will be accepted.
   5. Revise content of all returned documents as required by the comments.
   6. Submit one set of revised final documents for each Section in final form within 10 days after receipt of returned submittal.

C. Extended Warranties:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents no later than 14 days after Substantial Completion date.
   2. Compile all extended warranties, which are warranties only exceeding one year in length, and submit as one submittal.
   3. Submit to Owner and Architect one electronic copy of extended warranties as a Submittal into Owner's document management system as required in paragraph 1.03.C.1.
   4. This submittal will be reviewed and returned with Owner's and Architect's comments or it will be accepted.
   5. Revise content of all returned documents as required by the comments.
   6. Submit one set of revised final documents in final form within 10 days after receipt of returned submittal.

a. For items of Work for which acceptance is delayed beyond Substantial Completion date, submit within 14 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Record actual revisions to the Work on Construction Documents in the Record Documents Table in the Owner's document management system including:
   1. Drawings.
   2. Specifications.
   3. Addenda.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications:
   1. Identify the product manufacturer selected for the Project in the acceptable manufacturer's paragraph in each Section.
   2. Identify product substitutions or alternates utilized including manufacturer, manufacturer's website address, and model number.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

P. Additional Requirements: As specified in individual product specification sections.

3.05 EXTENDED WARRANTIES

A. Obtain extended warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain extended warranties and bonds until time specified for submittal.

END OF SECTION

SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Conveying systems.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.

B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Coordinate training sessions dates and times with Owner's Construction Supervisor.
   2. Notify Owner's Construction Supervisor not less than two weeks prior to start of training.
   3. Provide the following information for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided and determination as to whether equipment will be provided by Owner or Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstration may be combined with Owner personnel training if applicable.

C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than one week prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than one week after Substantial Completion.

3.02 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Owner will provide classroom and seating at no cost to Contractor.

C. Provide training in minimum two hour segments.

D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
   1. The location of the O&M manuals and procedures for use and preservation; backup copies.
   2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
   3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:
   1. Review the applicable O&M manuals.
   2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
   3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
   4. Provide hands-on training on all operational modes possible and preventive maintenance.
   5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
   6. Discuss common troubleshooting problems and solutions.
   7. Discuss any peculiarities of equipment installation or operation.
   8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
   9. Review recommended tools and spare parts inventory suggestions of manufacturers.
   10. Review spare parts and tools required to be furnished by Contractor.
   11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 024100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes excluding removal of hazardous materials and toxic substances.

1.02 RELATED REQUIREMENTS

A. Section 003100 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.

B. Section 011000 - Summary : Limitations on Contractor's use of site and premises.

C. Section 011000 - Summary : Sequencing and staging requirements.

D. Section 011000 - Summary : Description of items to be removed by Owner.

E. Section 011000 - Summary : Description of items to be salvaged or removed for re-use by Contractor.

F. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

G. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

H. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

I. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

J. Section 070150.19 - Preparation for Re-Roofing: Removal of existing roofing, roof insulation, flashing, trim, and accessories.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 017000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Use of explosives is not permitted.
   3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   4. Provide, erect, and maintain temporary barriers and security devices.
   5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.

F. Protect existing structures and other elements to remain in place and not removed.
1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

G. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

H. Provide and maintain daily the effectiveness of dust control walls and required asset protection.

I. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.02 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
1. Verify construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Record discrepancies encountered daily on record drawings.
4. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.

C. Remove existing work as indicated and required to accomplish new work.
1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
2. Remove items indicated on drawings.

D. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. See Section 011000 - Summary for limitations on outages and required notifications.
4. Verify that abandoned services serve only abandoned facilities before removal.

5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

F. Protect items to be salvaged by the Owner or reused in the Work by the Contractor.

3.03 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site daily as it accumulates. Do not use the Owner's dumpsters.

B. Remove materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof-mounted curbs.

B. Roofing nailers.

C. Preservative treated wood materials.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

B. AWPA U1 - Use Category System: User Specification for Treated Wood.

C. PS 20 - American Softwood Lumber Standard.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

1.06 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

1.07 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

1.08 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
   1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber in contact with roofing, flashing, or waterproofing.

PART 3 EXECUTION

2.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

2.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

2.03 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

C. Provide separation and no direct contact of aluminum flashings and preservative pressure treated roof blocking to avoid potential corrosion using roofing membrane or roofing felts.

2.04 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

2.05 CLEANING

A. Waste Disposal: See Section 017419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 070150.19
PREPARATION FOR RE-ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of existing roofing system in preparation for new roofing system in designated areas as indicated on drawings.

B. Removal of existing flashing and counterflashings.

C. Temporary roofing protection.

1.02 RELATED REQUIREMENTS

A. Section 015000 - Temporary Facilities and Controls: Waste Removal

B. Section 017419 - Construction Waste Management and Disposal: Waste Management, Disposal and Owner Recycling Requirements

C. Section 075200 - Modified Bituminous Membrane Roofing: Membrane Roofing System

D. Section 075200 - Modified Bituminous Membane Roofing.

E. Section 076200 - Sheet Metal Flashing and Trim: Replacement of flashing and counterflashings.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with affected mechanical and electrical work associated with roof penetrations.

B. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Attendees:
      a. Architect.
      b. Contractor.
      c. Owner.
      d. Installer.
      e. Roofing system manufacturer's field representative.
      f. Inspection and Testing Agency Representatives.

C. Schedule work to coincide with commencement of installation of new roofing system.

1.04 QUALITY ASSURANCE

A. Materials Removal Firm Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

1.05 FIELD CONDITIONS

A. Existing Roofing System: Modified bituminous roofing.

B. Do not remove existing roofing membrane when weather conditions threaten the integrity of building contents or intended continued occupancy.

C. Maintain continuous temporary protection prior to and during installation of new roofing system.

D. Provide notice at least three days before starting activities that will affect normal building operations.

E. Verify that occupants have been evacuated from building areas when work on structurally impaired roof decking is scheduled to begin.

F. Owner will occupy building areas directly below re-roofing area.
   1. Provide Owner with at least 48 hours written notice of roofing activities that may affect their operations and to allow them to prepare for upcoming activities as necessary.
   2. Do not disrupt Owner's operations or activities.
   3. Maintain access of Owner's personnel to corridors, existing walkways, and adjacent buildings.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 COMPONENTS

A. See the following sections for additional information on components relating to this work:
   1. Replacement and removal of existing roofing system in preparation for new roofing system in designated areas as indicated on drawings, refer to Section 075200.
   2. Remove existing flashing and counterflashings in preparation for replacement of these materials as part of this work, see Section 076200 for material requirements.

2.02 MATERIALS

A. Patching Materials: Provide necessary materials in accordance with requirements of existing roofing system.

B. Temporary Roofing Protection Materials:
   1. Contractor's responsibility to select appropriate materials for temporary protection of roofing areas as determined necessary for this work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing roof surface has been cleared of materials being removed from existing roofing system and ready for next phase of work as required.

3.02 PREPARATION

A. Sweep roof surface clean of loose matter.

B. Remove loose refuse and dispose of properly off-site.

3.03 MATERIAL REMOVAL

A. Remove only existing roofing materials that can be replaced with new materials the same day.

B. Remove metal counter flashings.

C. Scrape roofing gravel from membrane surface without causing serious damage to membrane felts.

D. Remove damaged portions of roofing membrane, perimeter base flashings, flashings around roof protrusions, pitch pans and pockets and insulation vents.

E. Cut and lay flat any membrane blisters.

F. Remove damaged insulation and fasteners, cant strips, blocking.

G. Repair existing wood deck surface to provide smooth working surface for new roof system.

3.04 INSTALLATION

3.05 FIELD QUALITY CONTROL

A. Independent agency inspection and testing will be provided under provisions of Section 014000.

B. The drawings identify the exact limits to material removal.

C. Testing will identify the condition of existing materials and their reuse, repair or removal.

D. Test Reports: Indicate existing insulation moisture content.

3.06 PROTECTION

A. Provide temporary protective sheeting over uncovered deck surfaces.

B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.

C. Provide for surface drainage from sheeting to existing drainage facilities.

D. Do not permit traffic over unprotected or repaired deck surface.

END OF SECTION

SECTION 075200
MODIFIED BITUMINOUS MEMBANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modified bituminous roofing membrane, conventional application.

B. Insulation, flat and tapered.

C. Cover board.

D. Wood blocking and framing.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood nailers and curbs.

B. Section 070150.19 - Preparation for Re-Roofing.

1.03 REFERENCE STANDARDS

A. ANSI/SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low-Slope Roofing Systems;

B. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board.

C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

E. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement.

G. ASTM D6222/D6222M - Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

H. ASTM D6223/D6223M - Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

I. FM DS 1-28 - Wind Design.

J. NRCA (RM) - The NRCA Roofing Manual.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of associated flashings and counterflashings installed by other sections.

B. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's catalog data for membrane and bitumen materials, base flashing materials, insulation, and surfacing.

C. Shop Drawings: Indicate base flashing details, base flashing details, base flashing details, base flashing details, and base flashing details.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Field Reports: Indicate procedures followed.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact unless otherwise indicated.

B. Store products in weather protected environment, clear of ground and moisture.

C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

D. Stand roll materials on end with selvage edges up.

E. Protect metal flashing and counter-flashings from damage.

F. Do not stockpile materials on roof without first obtaining permission from Owner.

G. Protect foam insulation from direct exposure to sunlight.

1.07 FIELD CONDITIONS

A. Do not apply roofing membrane when environmental conditions are outside the ranges recommended by manufacturer.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide 20-year manufacturer's material and labor warranty to cover failure to prevent penetration of water.

C. Scope of Coverage: Repair any leak in the modified bitumen roofing system caused by the ordinary wear of the elements, manufacturing defect in materials, and the workmanship used to install these materials:
   1. Membranes and Sheets.
   2. Insulation.
   3. Flashings.
   4. Fasteners.
   5. Adhesives.
   6. Metal Edges and Coping.
   7. Accessories.

D. Limit of Liability: No dollar limitation.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Description: APP modified bitumen membrane roofing installed over metal deck.
   1. Cap Sheet.
   2. Base Ply.
   3. Cover Board.
   4. Insulation.

2.02 MANUFACTURERS

A. Modified Bituminous Membrane Roofing:
   1. Elevate Building Products Company: www.holcimelevate.com.

2. US Ply, Inc.: www.usply.com.
3. Johns Manville: www.jm.com
4. Substitutions: Not permitted.

B. Insulation:
1. Atlas Roofing Corporation: www.atlasroofing.com.
2. GAF: www.gaf.com/sle.
3. Elevate Building Products Co.: www.holkimelevate.com.
4. Johns Manville: www.jm.com
5. Wind Resistance Classification: Factory Mutual 1-75, in accordance with FM DS 1-28.
   a. Perimeter Uplift Pressure: 105 pounds/square foot.
   b. Field-of-Roof Uplift Pressure: 60 pounds/square foot.
   c. Dimension of perimeter zone is the lesser of 40 percent of the building height or 10 percent of the least plan dimension in increments of 4 feet.

C. Acceptable Insulation Types - Constant Thickness Application:
1. Minimum 2 layers of molded polystyrene, polyisocyanurate, or composite board.
2. Bottom layer of cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, composite, or cellular glass board covered with single layer of cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, or composite board.

D. Acceptable Insulation Types - Tapered Application:
1. Uniform thickness cellulose, perlite, composite, polyisocyanurate, extruded polystyrene, molded polystyrene, glass fiber, or cellular glass board covered with tapered extruded polystyrene or perlite board.

2.03 MEMBRANE AND SHEET MATERIALS

A. Membrane Cap Sheet: Polymer modified asphalt, reinforced with non-woven fabric; granule surfaced; with the following characteristics:
1. Minimum Quality: ASTM D6223/D6223M Type II Grade G; atactic polypropylene (APP) modified, polyester and glass fiber reinforced.
2. Minimum Thickness: 160 mils.
3. Minimum Average Weight: 0.9 lb/sq ft.
4. Sheet Width: 39 inch.
5. Model:
   a. Elevate (Firestone), APP 180 FR Cool.
   b. US Ply, Safeweld X4FR APP.
   c. Johns Manville, Tricor M FR
6. Substitutions: Not permitted.

B. Membrane Base Ply: Polymer modified asphalt, reinforced with non-woven fabric; smooth surfaced; with the following characteristics:
1. Minimum Quality: ASTM D6222/D6222M Type I, Grade S; atactic polypropylene (APP) modified, polyester reinforced or ASTM D6223/D6223M Type I, Grade S; atactic polypropylene (APP) modified, polyester and glass fiber reinforced..
2. Color: Black.
3. Minimum Thickness: 155 mils.
4. Minimum Average Weight: 0.9 lb/sq ft.
5. Sheet Width: 39 inch.
6. Model:
   a. Elevate (Firestone) APP 160 Cool.
   b. US Ply, Safeweld X4S APP.
   c. Johns Manville, Bicor S
7. Substitutions: Not permitted.

C. Flexible Flashing Material: Same material as membrane.

2.04 BITUMINOUS MATERIALS

A. Membrane Adhesive: ASTM D3019/D3019M, Type III.
   1. Products:
      a. Elevate (Firestone); Multi-Purpose MB Cold Adhesive.
      b. US Ply; Safeweld Premium APP Modified Adhesive.
      c. Johns Manville; MBR Cold Application Adhesive
   2. Substitutions: Not permitted.

B. Asphalt Primer: ASTM D41/D41M, asphalt type.

C. Asphalt Roof Cement: ASTM D4586/D4586M, Type II, asbestos-free.
   1. Products:
      a. Elevate (Firestone); Multi-Purpose MB Cold Adhesive.
      b. US Ply; USP 954 Premium Modified Flashing Cement.
      c. Johns Manville, MBR Utility Cement
   2. Substitutions: Not permitted.

2.05 COVER BOARD

A. Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch thick.
   1. Products:

2.06 INSULATION

A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 2, and with the following characteristics:
   1. Board Size: 48 inch X 48 inch flat, 48 inch X 96 inch flat, and 48 inch X 48 inch tapered.
   2. Flat Board Thickness: 2.5 inch minimum first layer and 1.5 inch minimum additional layers.
   3. Tapered Board: Slope as indicated; minimum thickness 1.5 inch; fabricate of fewest layers possible.
   4. Thermal Resistance: R-value of 5.7 per inch thickness.
   5. Product:
      a. Atlas Roofing Corporation; ACFoam-II and Tapered ACFoam-II.
      b. GAF; EnergyGuard PolyIso and EnergyGuard PolyIso Tapered.
      c. Elevate (Firestone); ISO 95+ GL Insulation and Tapered Insulation
      d. Johns Manville, ENRGY3
   6. Substitutions: Not permitted.

2.07 SURFACING MATERIALS - CONVENTIONAL APPLICATION

2.08 WOOD BLOCKING AND FRAMING

A. Wood blocking and framing used for perimeter nailers, curbs, parapets, and other framed structures as indicated on drawings.

B. Description: Structural Grade No. 2 or better Southern Pine, Douglas Fir, or Exterior Grade plywood.
   1. Nailer Width: Minimum 3-½ inch (nominal) wide or as wide as the nailing flange of each roof accessory unless otherwise indicated on the drawings.
   2. Nailer Thickness: Thickness of roof insulation.
   3. Solid blocking only; use of spacers is prohibited.
   4. All wood shall be pressure treated for rot resistance.

C. Reference Standards:
   1. Southern Pines: PS 20; SPIB Grading Rules.
   2. Western Woods: PS20; WWPA Grading Rules.
   3. Plywood: PS 1; APA Grades Stamps.

4. Pressure Preservative Treatment: AWPB LP2

2.09 ACCESSORIES

A. Metal Edges and Coping: Anodized aluminum, minimum.050 inch thickness, complying with ANSI/SPRI ES-1.
   1. Color as selected by Architect from manufacturer's full range of colors.

B. Crickets: Fabricated from same material as insulation.

C. Roof Drain Sumps: Factory tapered, asphalt-impregnated wood fiberboard complying with ASTM C208, Type II, Grade 2.

D. Cant and Edge Strips: Asphalt-impregnated wood fiberboard, compatible with roofing materials ; cants formed to 45 degree angle, tapered edge strips, and other configurations as detailed.

E. Insulation Adhesive: Single or two-component low-rise polyurethane adhesive designed for anchoring acceptable roof insulation to acceptable substrates, and to adhere multiple layers of insulation.
   1. Products:
      a. Elevate (Firestone); I.S.O. series of products.
      b. 3M; CR-20.
      c. Johns Manville, Two-Part Urethane Insulation Adhesive
   2. Substitutions: Not permitted.

F. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

G. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
   1. Fasteners, frequency and patterns are to be selected by the Contractor based upon manufacturer's requirements to resist all anticipated loads, based on pull-out testing of the deck material and uplift loads defined in SYSTEM DESIGN CRITERIA in this section.
   2. Heavy Duty Fasteners:
      a. Heavy duty threaded fastener with polymer coating and drill point tip capable of penetrating 20 gauge steel, of sufficient length to penetrate deck a minimum dimension as listed below.
      b. Substrate and minimum penetration:
         1) Metal Deck, 3/4 inch.
      c. Provide galvanized metal or polymer washer at each fastener; approximate diameter between 2 and 3 inches.
      d. Cut off fasteners in interior spaces where deck is left exposed leaving manufacturer's required penetration length.
      e. Paint fasteners in interior spaces where deck is left exposed to match color of exposed deck.
   3. Product:
      a. Elevate (Firestone); Fasteners.
      b. US Ply; PlyFast Fasteners.
      c. Johns Manville, JM Fasteners
   4. Substitutions: Not permitted.
   5. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.

H. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

1. Examine roof deck to determine that it is sufficiently rigid to support roofers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips, other accessories, nailing strips, other accessories, reglets, other accessories, and other accessories are in place.

F. Commencement of work on site shall indicate acceptance of existing conditions.
1. Report any unsatisfactory conditions in writing to the Owner.

3.02 PREPARATION - METAL DECK

A. For direct application of rigid insulation to metal deck, verify deck is clean and smooth, flat, free of depressions, waves, or projections and suitable for installation of roof system.

3.03 WOOD NAILER LOCATION AND INSTALLATION

A. Total wood nailer height shall match the total thickness of insulation being used and shall be installed with a 1/8 inch gap between each length and at each change of direction.

B. Wood nailers shall be firmly fastened to the deck.

C. Mechanically fasten wood nailers to resist a force of 200 pounds per linear foot.

D. Wood nailers are required around the perimeter of all roof penetrations that exceed 12 inches in any direction.

3.04 INSTALLATION - INSULATION

A. Attachment of Insulation: Mechanically fasten first layer of flat insulation to deck in accordance with roofing manufacturer's instructionsand attach all subsequent layers of flat and tapered insulation with insulation adhesive in accordance with manufacturer's instructions.
1. Use fastener type and fastening pattern as required to achieve wind resistance specified.

B. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

C. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
1. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

D. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

E. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 24 inches and as indicated on drawings.

F. Do not apply more insulation than can be covered with membrane in same day.

3.05 INSTALLATION - MEMBRANE

1. Install modified bituminous membrane roofing system in accordance with manufacturer's recommendations and NRCA (RM) applicable requirements.
2. Install membrane; lap and seal edges and ends permanently waterproof.
3. Install smooth, free from air pockets, wrinkles, fish-mouths, or tears. Ensure full bond of membrane to substrate.
4. At end of day's operation, install waterproof cut-off. Remove cut-off before resuming roofing.
5. At intersections with vertical surfaces:
   a. Extend membrane over cant strips and up a minimum of 8 inches onto vertical surfaces or as indicated on drawings.
   b. Apply flexible flashing over membrane.
6. Coordinate installation of roof drains and sumps and related flashings.

7. Attach with cold adhesive with heat welded seams using torch down method.
8. End Lap Seams: End lap seams shall be a minimum of 6 inches width, offset a minimum of 18 inches.
9. Starting at the low point of the roof, embed one layer of base ply in a uniform application of cold adhesive.
10. Embed the full width of base ply in cold adhesive at a rate of 1.5 gallons to 2 gallons per 100 square feet as recommended by the manufacturer, with no adhesive applied in the side or end lap areas.
11. Apply the cold adhesive using a 1/4 inch notched neoprene squeegee or by spraying.
12. Heat fuse all seams using torch down method in accordance with manufacturer's recommendations; cold adhesive in seams is not acceptable.
13. If the base ply has been used as a temporary roof for more than 10 days, power wash clean and allow to dry.
14. Embed the full width of cap sheet in cold adhesive at a rate of 1.5 gallons to 2 gallons per 100 square feet as recommended by the manufacturer, with no adhesive applied in the side or end lap areas.
15. Apply granules to areas of bleed out while the areas remain hot.

3.06 TORCHED HEAT FUSED SEAM APPLICATIONS

A. When heat fusing to cap sheet in areas such as end laps, base flashings, and patches that have granules on receiving surface, heat until granules in the underlying sheet are embedded.

B. Where flashing laps onto field cap sheet, the lap area shall be completed by heat fusing in accordance with manufacturer's instructions.

C. Embed granules with a hot trowel by heating surface and troweling-in all granules until a uniform black surface coated with compound is achieved in lap area.

D. Any area of the sheet not protected with a granule surface shall be dressed with additional loose granules or patched with an additional piece of cap sheet membrane.

3.07 FLASHINGS

A. Base flashings shall be set in flashing cement to surfaces that have been primed.

B. Where flashing laps onto field cap sheet, the lap area shall be completed by heat fusing in accordance with manufacturer's instructions.

C. At outside corner transitions of base flashings, install notched patches to insure water tight corners per manufacturer's instructions.

D. When flashing into masonry, cut reglets into existing masonry, install and seal with sealant per Section 079200; termination bars are not accepatable as a substitute for reglets.

E. The use of surface mounted bar type terminations is prohibited.

3.08 METAL EDGES AND COPING

A. Install in locations indicated on drawings and recommended by manufacturer.

B. Mechanically fasten and flash as indicated on drawings and in accordance with manufacturer's instructions.

3.09 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

3.10 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.11 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

3.12 WARRANTY INSPECTIONS

A. Only if required by the manufacturer as a requirement of the warranty, provide follow up inspections as frequently as manufacturer requires, but no more frequently than annually.

B. Follow up inspections shall be performed jointly with a representative of the manufacturer and Owner present.

C. Manufacturer or their distributor shall be responsible to coordinate and schedule this meeting with the Owner.
   1. Manufacturer shall contact the Owner no less than 2 weeks in advance of planned inspection date to coordinate date and time of inspection.
   2. Manufacturer's and Owner's representative shall make themselves reasonably available for the inspection.

D. Failure of the manufacturer's representative to arrange any follow up inspections shall not be grounds to cancel the warranty.

END OF SECTION

SECTION 075600
FLUID-APPLIED ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-applied roofing materials.

B. Accessories.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

C. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

D. CRRC-1 - CRRC-1 Roof Product Rating Program Manual.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's data for membrane and accessory materials.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Manufacturer's Installation Instructions: Include standard installation instructions, acceptable installation temperature range, and procedures for unusual perimeter conditions.

E. Field Quality Control Test Report.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied roofing or waterproofing systems.
   1. Three years' documented experience manufacturing type of product specified.

B. Installer Qualifications: Company specializing in installation of fluid-applied roofing or waterproofing systems.
   1. Approved by roofing manufacturer.
   2. Five years of documented experience.

C. Contractor to provide daily logs includiing:
   1. Weather conditions.
   2. Wet mil. thickness.
   3. Appropriate repair information.
   4. Addressing any repairs made.

1.06 MOCK-UPS

A. See Section 014000 - Quality Requirements for additional requirements.

B. Construct mock-up consisting of at least 100 sq ft of specified roofing materials, including internal and external corners, base flashings, expansion joints, and counterflashings similar to those included as part of this work.
   1. Locate where directed.
   2. Mock-up may remain as part of work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.

C. Store materials in weather protected environment, clear of ground and moisture.

D. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

1.08 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

B. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide 20 year leak proof manufacturer warranty that roofing membrane will not crack, split, or flake under normal weather conditions and will not fail to resist penetration of water during that time period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Roofing:
   1. Garland Company, Inc: LiquiTec Liquid Roof Membrane; www.garlandco.com
   2. Poly-Armor Roofing; PolyArmor Reactive Plastic Membrane; www.polyarmorroof.com.
   3. Substitutions: Not permitted.

2.02 MATERIALS

A. Fluid-Applied Roofing: White, cold-applied; two-component; polyurea, approved by manufacturer for permanent exposure to weather and sunlight.
   1. Solar Reflectance Index (SRI) - Initial: 105, minimum, determined in accordance with CRRC-1.
   2. Dry Film Thickness (DFT): 80 mils, minimum; can be applied in two coats, base layer average of 40 mils minimun.
      a. Areas with asbestos containing materials apply average of 200 mils Dry Film Thickness (DFT) minimum, applied in three coats.
   3. Suitable for installation over metal, concrete, built-up bituminous, and single-ply sheet roofing substrates.
   4. VOC Content: None.
   5. Tensile Strength: 900 psi, minimum, measured in accordance with ASTM D412.
   6. Ultimate Elongation: 100 - 300% percent, measured in accordance with ASTM D412.
   7. Durometer Hardness, TypeD: 50 +/-10, minimum, in accordance with ASTM D2240.
   8. Adhesion Strength: Minimum 100 psi measured in accordance with ASTM D4541

B. Application: Provide elastomeric roof coating with elastomeric base coat.

2.03 ACCESSORIES

A. General: Auxiliary materials recommended by roofing system manufacturer for intenede use as compatible with the existing roofing system.

B. Flexible Flashing Sheet: Neoprene or other elastic type sheets approved by roofing membrane manufacturer.

C. Cant Strips: Premolded composition material, compatible with roofing membrane.

D. Counterflashings and fasteners: As recommended by roofing manufacturer.

E. Surface Primer Over Roof Substrate for Adhesion of Membrane: Low VOC primer as recommended by the roofing manufacturer for application over roofing substrates.
   1. Color: White.
   2. Roof Membrane Substrate: Includes galvanized metal, concrete, aluminum with Kynar finish, or rigid insulation.

F. Aggregate for Walkways: Silica sand, sieve size between 20 and 60; or other aggregate approved by roofing manufacturer.

G. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

H. Provide replacement expansion joint cover with Johns Manville Expand-O-Flash Expansion Joint Cover or equal. See product data following this section.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to starting this work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of roofing system.

C. Verify that substrate surfaces are smooth, free of honeycombs or pitting, and not detrimental to full contact bond of roofing materials.

D. Verify that roof openings, curbs, and items that penetrate surfaces to receive roofing materials are securely and properly installed.

3.02 PREPARATION

A. Clean and prepare surfaces to receive roofing in accordance with manufacturer's instructions and recommendations:
   1. Field verify roof condition and correct any roof damage prior to installation of the roofing system. Notify Owner/Architect.

B. Ballasted roof areas:
   1. Remove loose gravel from roof prior to installation of the roofing system.
   2. Field verify roof condition and correct any roof damage prior to installation of the roofing system. Notify Owner/Architect.
   3. Clean with the appropriagte cleaner and four thousand psi pressure system minimum.
   4. Allow roof to dry prior to roofing system application.
   5. Apply asphalt moisture care primer.
   6. Install two hundred mil polyuria system (200mil).

C. Seal cracks and non-moving open joints less than 1/2 inch wide with sealant using methods recommended by roofing and sealant manufacturers; do not seal expansion joints or moving joints of any width.

D. Repair existing holes, failed seams, cut, remove and patch areas damaged from prior moisture conditions and prior to roof system application.

E. Install cant strips at inside corners, where indicated and where required by roofing manufacturer.

F. Protect adjacent surfaces not designated to receive roofing.

3.03 INSTALLATION

A. Install fluid-applied roofing in accordance with manufacturer's instructions and recommendations, to specified minimum thickness.

B. Apply roofing materials to surfaces that are acceptable to manufacturer.

C. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect surface conditioner from rain or frost until dry.

D. Installations Over Sealant-Filled Joints: Install an extra coating of roofing material over joints at least 6 inches on each side of joint.

E. Joint Cover Assembly: Install at expansion joints, moving joints 1/2 inch wide or wider, and joints between horizontal and vertical surfaces.
   1. Use flexible flashing sheet wide enough to extend 6 inches on both sides of joint with a loop of sheet extended down into the joint to a depth at least the width of the joint.
   2. Embed sheet in one coat of fluid-applied roofing material.
   3. Before installing the remainder of the roofing material, install a compressible joint sealer backer rod into joint above loop to prevent roofing material from filling loop.

F. Penetrations: Unless otherwise indicated on drawings, or recommended by roofing manufacturer, seal flexible flashing sheet around penetrations and to roofing substrate prior to installation of roofing material, embedding flashing sheet in one coat of roofing material.

G. Applying to Vertical Surfaces: Extend fluid-applied roofing material at least 12 inches above horizontal roofing surfaces.

H. Embedded Flexible Flashing Sheet: Apply full thickness of roofing material over exposed flashing sheet.

I. Roof Drains: Unless otherwise recommended by roofing manufacturer, set drain flange in one coating of roofing material and extend a full thickness of roofing material onto drain clamp flange, with adequate coating of roofing material to ensure waterproof seal of clamp ring.

J. Apply extra thickness of roofing material at corners, intersections, and angles, when recommended by roofing manufacturer.

K. Walkways: Install an extra coating layer of roofing material in walkway areas with aggregate embedded in surface; locate walkways where indicated on drawings or as directed by Architect.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Owner will provide inspection services in accordance with Section 014000 - Quality Requirements, and Contractor shall provide temporary construction and materials for testing.

C. Upon completion of horizontal fluid-applied roofing material installation, install dam at perimeter of installation area in preparation for flood testing.

D. Flood area to a minimum depth of 1 inch with clean water, and after 72 hours, inspect for leaks.

E. If leaking is found, remove water, repair leaking areas with new roofing materials as directed by Owner, and repeat flood test. Repair damages to building related to roof test leakage.

F. When area is confirmed to be watertight, drain water and remove dam materials.

G. Materials applied must be wet mil tested and a non destructive dry mill tested performed daily, and recorded on a daily log.

H. After installation, materials applied must be tested for using a calibrated pull tester in accordance with ASTM D4541. Results must be logged and submitted showing a minimum test result of 100 PSI.

3.05 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must proceed over installed roofing materials, protect surfaces using durable materials acceptable to roofing material manufacturer.

END OF SECTION

SECTION 076200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

B. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement.

C. CDA A4050 - Copper in Architecture - Handbook.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

F. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

H. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.03 ACCESSORIES

A. Primer Type: Zinc chromate.

B. Protective Backing Paint: Zinc molybdate alkyd.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Seal metal joints watertight.

F. Counterflash with reglets at masonry. Surface mounted termination bars are not acceptable.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 077200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Curbs.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
   1. Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF CURBS

A. Roof Curbs Manufacturers:
   1. AES Industries Inc: www.aescurb.com.
   2. The Pate Company: www.patecurbs.com.
   3. Roof Products & Systems (RPS): www.rpscurbs.com.
   4. Substitutions: Not permitted.

B. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
   1. Roof Curb Mounting Substrate: Curb substrate consists of standing seam metal roof panel system.
   2. Sheet Metal Material:
   3. Galvanized Steel: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33; G60 coating designation; 18 gauge, 0.048 inch thick.
   4. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.

5. Fabricate curb bottom and mounting flanges for installation directly on metal roof panel system to match slope and configuration of system.
    a. Extend side flange to next adjacent roof panel seam and comply with seam configurations and seal connection, providing at least 6 inch clearance between curb and metal roof panel flange allowing water to properly flow past curb.
    b. Where side of curb aligns with metal roof panel flange, attach fasteners on upper slope of flange to curb connection allowing water to flow past below fasteners, and seal connection.
    c. Maintain at least 12 inch clearance from curb, and lap upper curb flange on underside of down sloping metal roof panel, and seal connection.
    d. Lap lower curb flange overtop of down sloping metal roof panel and seal connection.
6. Provide layouts and configurations indicated on drawings.

C. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
3. Height Above Roof Deck: 14 inches, minimum.

PART 3 EXECUTION

3.01 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.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

B. Remove burrs, and smooth out any sharp edges

C. Provide caps on all piping railings and ends and holes in pipe to eliminate bee hives.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Self-leveling pourable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

C. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

D. Test Reports: For joint sealants and backing, provide independent laboratory reports and test results showing negative asbestos containing materials content using Polarized Light Microscopy (PLM) test method.

E. Executed warranty.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver sufficient samples to manufacturer for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

F. Field Quality Control Plan:

1. Visual inspection of entire length of sealant joints.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Self-Leveling Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   3. Pecora Corporation: www.pecora.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.
   5. Sika Corporation: www.usa-sika.com.
   6. W.R. Meadows, Inc: www.wrmeadows.com/sle.
   7. Substitutions: See Section 016000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints:
      a. Intentional weep holes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
   1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

C. Interior Wet Areas: Bathrooms, restrooms, kitchens, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.

2.04 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
   5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION

SECTION 092116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Gypsum wallboard

D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing.

B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing.

C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

F. ASTM C1396/C1396M - Standard Specification for Gypsum Board.

G. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels.

H. GA-216 - Application and Finishing of Gypsum Panel Products.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Test Reports: For plaster, gypsum board panels and drywall compound, provide independent laboratory reports and test results showing negative asbestos containing materials content using Polarized Light Microscopy (PLM) test method.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.

2.02 METAL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.

B. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Custom Stud Inc: www.customstud.com
   3. Marino: www.marinoware.com/#sle.
   4. Telling Industries, www.buildstrong.com.

5. Substitutions: See Section 016000 - Product Requirements.

C. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: C-shaped with knurled or embossed faces.
   2. Runners: U shaped, sized to match studs.

D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

E. Nail Guard:
   1. Provide nail guard as required by local authority having jurisdiction.
   2. Provide nail guard on face of studs where piping and conduit are routed through the partition within 1-1/4" of the face of the studs.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com/#sle.
   2. CertainTeed Corporation: www.certainteed.com/#sle.
   3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   4. National Gypsum Company: www.nationalgypsum.com/#sle.
   5. PABCO Gypsum: www.pabcogypsum.com/#sle.
   6. USG Corporation: www.usg.com/#sle.
   7. Substitutions: See Section 016000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Thickness:
      a. Vertical Surfaces: 5/8 inch.
   4. Paper-Faced Products:
      a. American Gypsum Company; LightRoc Gypsum Wallboard: www.americangypsum.com/#sle.
      b. Georgia-Pacific Gypsum; ToughRock: www.gpgypsum.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   5. Glass Mat Faced Products Regular and Type X:
      a. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
      b. Georgia-Pacific Gypsum; DensArmor Plus Fireguard C: www.gpgypsum.com/#sle.
      c. National Gypsum Company; Gold Bond eXP Fire-Shield Interior Extreme Gypsum Panel: www.nationalgypsum.com/#sle.
      d. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
      e. Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with AISI S220 and manufacturer's instructions.

B. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.

2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

D. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
1. Orientation: Horizontal.
2. Spacing: At 16 inches on center.

E. Blocking: Install wood blocking for support of:
1. Framed openings.
2. Wall-mounted cabinets.
3. Plumbing fixtures.
4. Toilet partitions.
5. Toilet accessories.
6. Wall-mounted door hardware.

3.03 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated. Walls receiving marker board paint system including new and existing walls.
2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
3. Level 3: Walls to receive textured wall finish.
4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.

5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
6. Level 0: Temporary partitions.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.07 CLEANING

A. Clean area, then collect waste material and place in waste containers. Remove waste daily from site.

3.08 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 095100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

1.06 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels: Match Existing
   1. Armstrong World Industries, Inc; Fine Fisssured: www.armstrong.com.
   2. Acoustic Ceiling Products, Inc; Genesis Standard Series Printed Pro: www.acpideas.com.
   3. CertainTeed Corporation; Fine Fissured High NRC Mineral Fiber Ceiling Panel: www.certainteed.com.

B. Acoustic Tiles/Panels: New Construction
   1. Rockfon; Rockfon Education Standard: www.rockfon.com.

C. Substitutions: See Section 016000 - Product Requirements.

D. Suspension Systems:
   1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
   1. VOC Content: As specified in Section 016116.

B. Acoustical Panels, Type 24X24: Painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
   2. Size: 24 by 24 inches.
   3. Panel Edge: Square.
   4. Color: White.
   5. Suspension System: Exposed grid.
   6. Products:
      a. Armstrong World Industries, Inc; Fine Fissured 1728 HumiGuard Plus: www.armstrongceilings.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

C. Acoustical Panels, Type 24x48: Painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
      a. Form: 2, water felted.
      b. Pattern: "B" - perforated, randomly spaced large holes.
   2. Panel Edge: Square.
   3. Color: White.
   4. Suspension System: Exposed grid.
   5. Products:
      a. Armstrong World Industries, Inc: Fine Fissured 1729 HumiGuard Plus; www.armstrongceilings.com/#sle.

D. Acoustical Panels New Construction: Stone wool (Mineral Wool) ceiling tiles with factory applied latex paint on glass scrim surface Type XX - Stone wool base with membrane faced overlay, with the following characteristics:
   1. Classification: ASTM E1264 Type XX.
      a. Form: 2, water felted.
      b. Pattern: "G" - smooth.
   2. Size: 24 by 48 inch.
   3. Thickness: 5/8 inches.
   4. Light Reflectance: 0.84 percent, determined in accordance with ASTM E1264.
   5. NRC: 0.70 deter,omed om accprdamce wotj ASTM E1264 .
   6. Panel Edge: Square.
   7. Color: White.
   8. Suspension System: Exposed grid.
   9. Products:
      a. Rockfon; Rockfon Education Standard: www.rockfon.com

E. Acoustical PanelsFood Service Areas Washable: Mineral fiber with membrane-faced overlay, with the following characteristics:
   1. Classification: ASTM E1264 Type IV.
   2. Panel Edge: Square.
   3. Color: White.
   4. Suspension System: Exposed grid.
   5. Products:
      a. Armstrong World Industries, Inc; 1720 Clean Room FL: www.armstrongceilings.com/#sle.
      b. Armstrong World Industries, Inc; 1721 Clean Room FL: www.armstrongceilings.com/#sle.
      c. USG Corporation; Mars Acoustical Panels: www.usg.com/ceilings/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.

2.03 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
   2. At Concealed Grid: Provide exposed L-shaped molding.

D. Touch-up Paint: Type, color, and sheen to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, ASTM E580/E580M, ASTM C636/C636M, and ASTM E580/E580M and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use 1" seismic perimeter molding
   2. Do not use rivets where exposed to public.

K. Replace missing, broken bent or stained grid and tile within the work area.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges, stains or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

F. Where round obstructions occur, provide preformed closures to match perimeter molding.

G. Install hold-down clips on panels within 20 ft of an exterior door, and as directed by contract documents.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 099123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. All miscellaneous steel and unfinished metal elements.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Marble, granite, slate, and other natural stones.
   6. Floors, unless specifically indicated.
   7. Ceramic and other tiles.
   8. Glass.
   9. Acoustical materials, unless specifically indicated.
   10. Concealed pipes, ducts, and conduits.
   11. Bathroom and Accessories
   12. FRP Doors

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 092116 - Gypsum Board Assemblies: New and existing wall preparation for final finish.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
   2. MPI product number (e.g., MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for submittals.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:
   1. Behr Process Corporation: www.behr.com/#sle.
   2. Glidden Paint: www.glidden.com
   3. PPG Paints: www.ppgpaints.com/#sle.
   4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: Not permitted.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   3. Supply each paint material in quantity required to complete entire project's work from a single production run.
   4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 016116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated on drawings.
   1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   3. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint GI-P-1A - Gypsum Board/Plaster, Primer, 1 Coat:
   1. One coat of latex primer sealer.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.06 SCHEDULE - PAINT SYSTEMS

END OF SECTION

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Angle valves.
B. Globe valves.
C. Ball valves.
D. Butterfly valves.
E. Check valves.
F. Gate valves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.
B. Section 083100 - Access Doors and Panels.
C. Section 230548 - Vibration and Seismic Controls for HVAC.
D. Section 230553 - Identification for HVAC Piping and Equipment.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. TFE: Tetrafluoroethylene.
I. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch.
B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard.
C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
D. ASME B31.9 - Building Services Piping.
E. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
F. ASTM A536 - Standard Specification for Ductile Iron Castings.
G. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
H. AWWA C606 - Grooved and Shouldered Joints.
I. MSS SP-45 - Drain and Bypass Connections.
J. MSS SP-67 - Butterfly Valves.

K. MSS SP-68 - High Pressure Butterfly Valves with Offset Design.

L. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends.

M. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends.

N. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service.

O. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves.

P. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.

Q. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

B. Provide the following valves for the applications if not indicated on drawings:
   1. Throttling (Hydronic): Butterfly, Ball, Globe, and Angle.
   2. Isolation (Shutoff): Butterfly, Gate, Ball, and Plug.
   3. Dead-End: Butterfly, single-flange (lug) type.

C. Heating Hot Water Valves:
   1. Size 2 inch and Smaller, Brass and Bronze Valves:
      a. Threaded ends.
      b. Angle: Bronze disc, Class 125.
      c. Ball: Full port, one piece, brass trim.
      d. Swing Check: Bronze disc, Class 125.
      e. Gate: NRS, Class 125.
      f. Globe: Bronze disc, Class 125.
   2. Size 2-1/2 inch and Larger, Iron Valves:
      a. 2-1/2 inch to 4 inch: Threaded ends.
      b. Ball: 2-1/2 inch to 10 inch, Class 150.
      c. Single-Flange Butterfly: 2-1/2 inch to 12 inch, aluminum-bronze disc, EPDM seat, 200 CWP.
      d. Butterfly: High performance, single flange, Class 150.
      e. Swing Check: Metal seats, Class 125.
      f. Swing Check: 2-1/2 inch to 12 inch, lever and spring closure control, Class 125.
      g. Plate-Type Check: Single plate, metal seat, Class 125 .
      h. Gate: NRS, Class 125.
      i. Globe: 2-1/2 inch to 12 inch, Class 125.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Hand Lever: Quarter-turn valves 6 inch and smaller.

D. Valves in Insulated Piping: Provide 2 inch stem extensions and the following features:
   1. Gate Valves: Rising stem.
   2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   3. Butterfly Valves: Extended neck.

E. Memory Stops: Fully adjustable after insulation is installed.

F. Valve-End Connections:

1. Threaded End Valves: ASME B1.20.1.
2. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
3. Solder Joint Connections: ASME B16.18.
4. Grooved End Connections: AWWA C606.

G. General ASME Compliance:
1. Building Services Piping Valves: ASME B31.9.

H. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.03 BRONZE, ANGLE VALVES

A. CWP Rating: Class 125: 200 psi and Class 150: 300 psi:
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded.
4. Stem: Bronze.
5. Disc: Bronze, PTFE, or TFE.
6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.04 BRONZE, GLOBE VALVES

A. CWP Rating: Class 125: 200 psi:
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded or solder joint.
4. Stem and Disc: Bronze or PTFE.
5. Packing: Asbestos free.
6. Handwheel: Malleable iron.

2.05 IRON, GLOBE VALVES

A. CWP Ratings: Class 125: 200 psi and Class 250: 500 psi:
1. Comply with MSS SP-85, Type I.
2. Body: Gray iron; ASTM A126, with bolted bonnet.
3. Ends: Flanged.
4. Trim: Bronze.
5. Packing and Gasket: Asbestos free.
6. Operator: Handwheel or chainwheel.

2.06 BRONZE, BALL VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Bronze or Brass Trim:
1. Comply with MSS SP-110.
2. WSP Rating: 150 psi.
3. WOG Rating: 400 psi.
4. Body: Forged bronze or dezincified-brass alloy.
5. End Connections: Pipe thread or solder.
6. Seats: PTFE.
7. Stem: Bronze or brass.
8. Ball: Chrome plated brass.
9. Operator: Provide lockable handle and stem extension.

2.07 IRON, BALL VALVES

A. Split Body, Full Port:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psi.
   3. Body: ASTM A126, gray iron.
   4. Ends: Flanged.
   5. Seats: PTFE.
   6. Stem: Stainless steel.
   7. Ball: Stainless steel.

2.08 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Wafer Style:
   1. Comply with MSS SP-67, Type I.
   2. Wafer Style, CWP Ratings:
      a. Sizes 2 to 12 inch: 200 psi.
      b. Sizes 14 to 24 inch: 150 psi.
      c. Vacuum Service: Down to 29.9 in-Hg.
   3. Body Material: ASTM A126 cast iron or ASTM A536 ductile iron.
   4. Stem: One or two-piece stainless steel.
   5. Seat: NBR.
   6. Disc: Aluminum-bronze.

2.09 HIGH-PERFORMANCE, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type; Bidirectional dead end service without downstream flange:
   1. Comply with MSS SP-68.
   2. Class 150: CWP Rating: 285 psi at 100 degrees F.
   3. Body: Provide carbon steel, cast iron, ductile Iron, or stainless steel.
   4. Seat: Metal or reinforced PTFE.
   5. Offset stem: Stainless steel.
   6. Disc: Carbon steel.

2.10 BRONZE, SWING CHECK VALVES

A. Class 150:
   1. Pressure and Temperature Rating: MSS SP-80, Type 3.
   2. Design: Y-pattern, horizontal or vertical flow.
   3. CWP Rating: 300 psi.
   4. Body: Bronze, ASTM B62.
   5. End Connections: Threaded or soldered.
   6. Disc: Bronze.

2.11 IRON, FLANGED END SWING CHECK VALVES

A. Class 125:
   1. 150 psi with metal seats.
   2. 200 psi with metal seats and nonmetallic-to-metal seats.

2.12 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125:
   1. Comply with MSS SP-71, Type I.
   2. Body Design: Clear or full waterway.
   3. Body Material: ASTM A126, gray iron with bolted bonnet.
   4. Ends: Flanged.
   5. Trim: Bronze.
   6. Gasket: Asbestos free.
   7. Closer Control: Factory installed, exterior lever, and spring or weight.

2.13 IRON, PLATE-TYPE CHECK VALVES

2.14 BRONZE, GATE VALVES

A. Nonrising Stem or NRS:
   1. Pressure-Temperature Range: MSS SP-80, Type I.
   2. Class 125:
   3. Class 150: CWP Rating; 300 psi.
   4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
   5. Ends Connections: Threaded or solder.
   6. Stem: Bronze.
   7. Disc: Solid wedge; bronze.
   8. Packing: Asbestos free.
   9. Handwheel Operator: Malleable iron, bronze, or aluminum.

2.15 IRON, GATE VALVES

A. NRS or OS&Y:
   1. Comply with MSS SP-70, Type I.
   2. Body Material: Gray iron with bolted bonnet.
   3. Ends: Flanged.
   4. Trim: Bronze.
   5. Disc: Solid wedge.
   6. Packing and Gasket: Asbestos free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Install check valves where necessary to maintain direction of flow as follows:
   1. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

SECTION 230548
VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Seismic control requirements.
   1. Includes requirements for seismic qualification of equipment not specified in this section.

C. Vibration isolators.

D. External seismic snubber assemblies.

E. Seismic restraint systems.

F. Vibration-isolated and/or seismically engineered roof curbs.

1.02 RELATED REQUIREMENTS

A. Section 232500 - HVAC Water Treatment

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).

B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

B. ASCE 19 - Structural Applications of Steel Cables for Buildings.

C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications.

D. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment.

E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

F. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.

G. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage.

H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172.

I. ICC (IBC) - International Building Code.

J. ICC-ES AC156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components.

K. MFMA-4 - Metal Framing Standards Publication.

L. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Seismic Controls:

a. Coordinate the arrangement of seismic restraints with piping, conduit, equipment, and other potential conflicts installed under other sections or by others.
b. Coordinate the work with other trades to accommodate relative positioning of essential and nonessential components in consideration of seismic interaction.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
2. Seismic Controls: Include seismic load capacities.

D. Shop Drawings - Vibration Isolation Systems:
1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.

E. Shop Drawings - Seismic Controls:
1. Include dimensioned plan views and sections indicating proposed HVAC component locations and distributed system routing, with locations and details of gravity supports and seismic restraints and associated attachments.
2. Identify anchor manufacturer, type, minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
3. Indicate proposed arrangement of distributed system trapeze support groupings.
4. Indicate proposed locations for distributed system flexible fittings and/or connections.
5. Indicate locations of seismic separations where applicable.
6. Include point load drawings indicating design loads transmitted to structure at each attachment location.

F. Seismic Design Data:
1. Compile information on project-specific characteristics of actual installed HVAC components necessary for determining seismic design forces required to design appropriate seismic controls, including but not limited to the following.
2. Include structural calculations, stamped or sealed by seismic controls designer, demonstrating suitability of seismic controls for seismic design forces.

G. Product Data:
1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

H. Shop Drawings:
1. See shop drawing requirement for seismic restraint in Section?????. If shop drawing is required, then the shop drawing shop drawing shall include:
a. Seismic Restraint Details: Detailed drawings of seismic restraints and snubbers including anchorage details that indicate quantity, diameter, and depth of penetration, edge distance, and spacing of anchors.

I. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.07 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Perform design and installation in accordance with applicable codes.

C. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.

D. Equipment Isolation: As indicated on drawings.

2.02 SEISMIC CONTROL REQUIREMENTS

A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.

B. Seismic Design Criteria: As indicated on drawings.

C. Seismic Restraints:
   1. Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
   2. Seismic Restraint Exemptions:
      a. Exemptions for Seismic Design Category D, E, and F:
         1) HVAC components with component importance factor (Ip) of 1.0 where all of the following apply:
            (a) The component is positively attached to the structure.
            (b) Flexible connections are provided between the component and associated ductwork, piping, and conduit.
            (c) Either:
               (1) The component weighs 400 pounds or less and has a center of mass located 4 feet or less above the adjacent floor level.
               (2) The component weighs 20 pounds or less or, in the case of a distributed system, 5 pounds per foot or less.
         2) HVAC piping with component importance factor (Ip) of 1.0 and nominal pipe size of 3 inch or less, or with component importance factor (Ip) of 1.5 and nominal pipe size of 1 inch or less; exemption does not apply to piping constructed of low-deformability materials (e.g., cast iron, glass, nonductile plastics).
      b. Ductwork Exemptions, All Seismic Design Categories:
         1) Ductwork not designed to carry toxic, highly toxic, or flammable gases and not used for smoke control where any of the following apply:
            (a) Trapeze supported ductwork weighing less than 10 pounds per foot.

(b) Hanger supported ductwork where each hanger in the duct run is 12 inches or less in length from the duct support to the supporting structure; rod hangers, where used, to be equipped with swivels.
(c) Ductwork having a cross sectional area of less than 6 square feet or weighing 17 pounds per foot or less, and where there are provisions to avoid impact with other ducts or mechanical components or to protect ducts in the event of such impact.

c. HVAC Piping Exemptions, All Seismic Design Categories:
1) Trapeze supported piping weighing less than 10 pounds per foot, where all pipes supported meet requirements for exemption as single pipes described under specific seismic design category exemptions above.
2) Hanger supported piping where each hanger in the piping run is 12 inches or less in length from the pipe support to the supporting structure; rod hangers, where used, to be equipped with swivels.

3. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
a. ASHRAE (HVACA).
b. FEMA 412.
c. FEMA 413.
d. FEMA 414.
e. FEMA E-74.
f. SMACNA (SRM).
4. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
5. Seismic Type Vibration Isolators:
a. Comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
6. External Seismic Snubber Assemblies:
a. Provide quantity and arrangement of external seismic snubber assemblies as required to restrain equipment in all directions (both lateral and vertical).
b. Do not use external seismic snubber assemblies that restrain equipment only in one or more lateral directions (but not vertical) except where uplift forces are zero or are addressed by other restraints.
7. Seismic Restraint Systems:
a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
c. Use only one restraint system type for a given HVAC component or distributed system (e.g., ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.
d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
e. Use rod stiffener clips to attach bracing to hanger rods as required to prevent rod buckling from vertical (upward) compressive load introduced by cable or rigid restraints loaded in tension, in excess of downward tensile load due to supported HVAC component weight.
f. Select hanger rods and associated anchorage as required to accommodate vertical (downward) tensile load introduced by rigid restraints loaded in compression, in addition to downward tensile load due to supported HVAC component weight.
g. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.

h. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
i. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.

8. Ductwork Applications:
a. Provide independent support and seismic restraint for in-line components (e.g., fans, heat exchangers, humidifiers) having an operating weight greater than 75 pounds.
b. Positively attach appurtenances (e.g., dampers, louvers, diffusers) with mechanical fasteners.

D. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
3. Do not use power-actuated fasteners.
4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
6. Concrete Housekeeping Pads:
a. Increase size of pad as required to comply with anchor requirements.
b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.

E. Seismic Interactions:
1. Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.
2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.

F. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:
a. Relative displacements at connections between components, including distributed systems (e.g., ductwork, piping); do not exceed load limits for equipment utility connections.
b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
c. Design displacements at seismic separations.
d. Anticipated drifts between floors.

2.03 MANUFACTURERS

A. The VMC Group; thevmcgroup.com

B. B-line: www.cooperindustries.com

C. Substitutions: See Section 016000 - Product Requirements.

2.04 PERFORMANCE REQUIREMENTS

A. General:
1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
2. Steel springs to function without undue stress or overloading.

3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75 percent of specified deflection.
5. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches between the base and floor or support beneath unless noted otherwise.

2.05 VIBRATION ISOLATORS

A. Manufacturers:
   1. Vibration Isolators:

B. General Requirements:
   1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
   2. Spring Elements for Spring Isolators:
      a. Color code or otherwise identify springs to indicate load capacity.
      b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
      c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
      d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
      e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
      f. Selected to function without undue stress or overloading.
   3. Seismic Snubbing Elements for Seismic Isolators:
      a. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
      b. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

C. Vibration Isolators for Nonseismic Applications:
   1. Resilient Material Isolator Pads:
      a. Description: Single or multiple layer pads utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material.
      b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
      c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
   2. Resilient Material Isolator Mounts, Nonseismic:
      a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.
   3. Open (Unhoused) Spring Isolators:
      a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
      b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
      c. Furnished with integral leveling device for positioning and securing supported equipment.
   4. Housed Spring Isolators:
      a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
      b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.

c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
d. Furnished with integral leveling device for positioning and securing supported equipment.

5. Spring Isolator Hangers, Nonseismic:
a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

D. Vibration Isolators for Seismic Applications:
1. Restrained Spring Isolators, Seismic:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) in series with elastomeric (e.g., neoprene, rubber) isolator material within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop; specifically designed and rated for seismic applications with integral snubbing in all directions.
b. Bottom Load Plate: Steel with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.
d. Provides constant free and operating height.

2. Resilient Material Isolator Hangers, Seismic:
a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) isolator material for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.

3. Spring Isolator Hangers, Seismic:
a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection; specifically designed and rated for seismic applications with vertical limit stop to prevent upward travel of hanger rod and cushion impact.
b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

2.06 EXTERNAL SEISMIC SNUBBER ASSEMBLIES

A. Description: Steel snubbing assemblies designed for external attachment to both equipment and supporting structure that, as part of a complete system, restrain equipment motion in all directions during a seismic event while maintaining vibration isolation during normal operation.

B. Seismic Snubbing Elements:
1. Air Gap: Between 0.125 inches and 0.25 inches unless otherwise indicated.
2. Points of Contact: Cushioned with resilient material, minimum 0.25 inch thick; capable of being visually inspected for damage and replaced.

C. Comply with:

2.07 SEISMIC RESTRAINT SYSTEMS

A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.

B. Cable Restraints:
1. Comply with ASCE 19.
2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.

3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
4. Use protective thimbles for cable loops where potential for cable damage exists.

C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

D. Comply with:
1. ASHRAE (HVACA) Handbook - HVAC Applications.
2. FEMA 412.
3. FEMA 413.
4. FEMA 414.
5. FEMA E-74.
6. SMACNA (SRM).

E. Cable Restraints:
1. Connections:

2.08 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS

A. Vibration Isolation Curbs:
1. Seismic Curb:
a. Location: Between structure and rooftop equipment.
b. Construction: Steel.
c. Integral vibration isolation to comply with requirements of this section.
d. Snubbers consist of minimum 0.25 inch thick resilient pads to avoid metal-to-metal contact without compromising vibration isolating capabilities.
e. Weather exposed components consist of corrosion resistant materials.

B. Seismic Type Nonisolated Curb and Fabricated Equipment Piers:
1. Location: Between structure and rooftop equipment.
2. Construction: Steel.
3. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CODE-REQUIRED SPECIAL INSPECTIONS

A. Arrange work to accommodate tests and/or inspections performed by Special Inspection Agency employed by Owner or Architect in accordance with Section 014533 and statement of special inspections as required by applicable building code.

B. Frequency of Special Inspections: Where special inspections are designated as continuous or periodic, arrange work accordingly.
1. Continuous Special Inspections: Special Inspection Agency to be present in the area where the work is being performed and observe the work at all times the work is in progress.
2. Periodic Special Inspections: Special Inspection Agency to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

C. Prior to starting work, Contractor to submit written statement of responsibility to authorities having jurisdiction and to Owner acknowledging awareness of special requirements contained in the statement of special inspections.

D. Special Inspection Agency services do not relieve Contractor from performing inspections and testing specified elsewhere.

3.03 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

E. Vibration Isolation Systems:
   1. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.
      b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
      c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
   2. Isolator Hangers:
      a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
      b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
   3. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
   4. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
   5. Adjust isolators to be free of isolation short circuits during normal operation.
   6. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

F. Seismic Controls:
   1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
   2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
   3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
   4. Equipment with Sheet Metal Housings:
      a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
      b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
      c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
   5. Concrete Housekeeping Pads:
      a. Size in accordance with seismic design to meet anchor requirements.
      b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
   6. Seismic Restraint Systems:
      a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
      b. Install restraints within permissible angles in accordance with seismic design.

c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

3.04 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

3.05 INSTALLATION - SEISMIC

A. Comply with:

B. Seismic Snubbers:

C. Suspended Mechanical Equipment:

D. Piping:
1. Pipes and Connections Constructed of Ductile Materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections):
2. Pipes and Connections Constructed of Non Ductile Materials (cast iron, no-hub, plastic or non-UL listed grooved coupling pipe):
3. Re-use of Existing Hangers:

3.06 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Vibration Isolation Systems:
1. Verify isolator static deflections.
2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

D. Seismic Controls:
1. Verify snubbing element air gaps.

E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

F. Inspect isolated equipment after installation and submit report. Include static deflections.

3.07 SCHEDULE

END OF SECTION

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, and function.

D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. All HVAC Equipment (air and water): Nameplates, and Ceiling tacks, where located above lay-in ceiling

B. Control Panels and Control Modules: Nameplates.

C. Fire Dampers and Combination Fire & Smoke Dampers: Nameplates, and Ceiling tacks, where located above lay-in ceiling.

D. Instrumentation: Tags, and Ceiling tacks, where located above lay-in ceiling.

E. Piping: Pipe markers.

F. Relays: Tags, and Ceiling tacks, where located above lay-in ceiling

G. Small-sized Equipment: Tags, and Ceiling tacks, where located above lay-in ceiling.

H. Tanks: Nameplates.

I. Valves: Tags, and ceiling tacks where located above lay-in ceiling.

J. Water Treatment Devices: Nameplates.

2.02 IDENTIFICATION MANUFACTURERS

A. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.

B. Seton Identification Products: www.seton.com.

C. Brady Corp. .

D. Craftmark Identification Systems.

E. Labelmaster

F. VisionMark, Inc.

G. Almetek Industries, Inc.

H. Advanced Graphic Engraving: www.advancedgraphicengraving.com.

I. MIFAB, Inc.: www.mifab.com.

J. Substitutions: See Section 016000 - Product Requirements.

2.03 NAMEPLATES

A. Letter Color: White.

B. Letter Height: 1/4 inch.

C. Background Color: Black.

D. Plastic: Comply with ASTM D709.

2.04 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Aluminum with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.05 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
   2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
   3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
   4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
   5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
   6. Ductwork and Equipment: 2-1/2 inch high letters.

B. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors complying with ASME A13.1.

2.06 PIPE MARKERS

A. Color: Comply with ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

E. Color code as follows:
   1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
   2. Toxic and Corrosive Fluids: Orange with black letters.
   3. Compressed Air: Blue with white letters.

2.07 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 099123 for stencil painting.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Section 099123.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.

G. Install in clear view and align with axis of piping.

H. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

I. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic and refrigerating systems.

1.02 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.

C. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Include at least the following in the plan:
      a. Preface: An explanation of the intended use of the control system.
      b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      d. Identification and types of measurement instruments to be used and their most recent calibration date.
      e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      f. Final test report forms to be used.
      g. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Submit under provisions of Section 014000.
   2. Revise TAB plan to reflect actual procedures and submit as part of final report.
   3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   6. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
   7. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.

b. Address of Testing, Adjusting, and Balancing Agency.
c. Telephone number of Testing, Adjusting, and Balancing Agency.
d. Project name and owner project number.
e. Project location.
f. Project Architect.
g. Project Engineer.
h. Project Contractor.
i. Project altitude.
j. Report date.

E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
2. SMACNA (TAB).
3. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.
3. Certified by one of the following:
a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
b. NEAABC BB, National Environmental Balancing Bureau: www.nebb.org/#sle.
c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.

13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 AIR SYSTEM PROCEDURE (AS APPLICABLE TO THE PROJECT)

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

O. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.07 WATER SYSTEM PROCEDURE (AS APPLICABLE TO THE PROJECT)

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

A. Test of existing prior to commencement of demolition.
   1. As specified on drawings.

B. Test, adjust, and balance the following:
   1. Packaged Roof Top Heating/Cooling Units.
   2. Fans.
   3. Air Terminal Units.
   4. Air Inlets and Outlets.

C. See drawing for additional information and requirement.

3.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.

6. Service factor.
7. Starter size, rating, heater elements.
8. Sheave Make/Size/Bore.

B. V-Belt Drives:
1. Identification/location.
2. Required driven RPM.
3. Driven sheave, diameter and RPM.
4. Belt, size and quantity.
5. Motor sheave diameter and RPM.
6. Center to center distance, maximum, minimum, and actual.

C. Combustion Equipment:
1. Boiler manufacturer.
2. Model number.
3. Serial number.
4. Firing rate.
5. Overfire draft.
6. Gas meter timing dial size.
7. Gas meter time per revolution.
8. Gas pressure at meter outlet.
9. Gas flow rate.
10. Heat input.
11. Burner manifold gas pressure.
12. Percent carbon monoxide (CO).
13. Percent carbon dioxide (CO2).
14. Percent oxygen (O2).
15. Percent excess air.
16. Flue gas temperature at outlet.
17. Ambient temperature.
18. Net stack temperature.
19. Percent stack loss.
20. Percent combustion efficiency.
21. Heat output.

D. Cooling Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Water flow, design and actual.
11. Water pressure drop, design and actual.
12. Entering water temperature, design and actual.
13. Leaving water temperature, design and actual.
14. Saturated suction temperature, design and actual.
15. Air pressure drop, design and actual.

E. Heating Coils:
1. Identification/number.
2. Location.

3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Water flow, design and actual.
7. Water pressure drop, design and actual.
8. Entering water temperature, design and actual.
9. Leaving water temperature, design and actual.
10. Entering air temperature, design and actual.
11. Leaving air temperature, design and actual.
12. Air pressure drop, design and actual.

F. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

G. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

H. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

I. Duct Traverses:
   1. System zone/branch.
   2. Duct size.
   3. Area.
   4. Design velocity.
   5. Design air flow.
   6. Test velocity.
   7. Test air flow.
   8. Duct static pressure.
   9. Air temperature.
   10. Air correction factor.

J. Duct Leak Tests:
   1. Description of ductwork under test.
   2. Duct design operating pressure.
   3. Duct design test static pressure.
   4. Duct capacity, air flow.
   5. Maximum allowable leakage duct capacity times leak factor.
   6. Test apparatus:
      a. Blower.
      b. Orifice, tube size.
      c. Orifice size.
      d. Calibrated.
   7. Test static pressure.
   8. Test orifice differential pressure.
   9. Leakage.

K. Air Monitoring Stations:
   1. Identification/location.
   2. System.
   3. Size.
   4. Area.
   5. Design velocity.
   6. Design air flow.
   7. Test velocity.
   8. Test air flow.

L. Flow Measuring Stations:
   1. Identification/number.
   2. Location.
   3. Size.
   4. Manufacturer.
   5. Model number.
   6. Serial number.
   7. Design Flow rate.
   8. Design pressure drop.
   9. Actual/final pressure drop.
   10. Actual/final flow rate.
   11. Station calibrated setting.

M. Terminal Unit Data:
   1. Manufacturer.
   2. Type, constant, variable, single, dual duct.
   3. Identification/number.
   4. Location.

5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.
10. Maximum actual air flow.
11. Inlet static pressure.

N. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Area factor.
6. Design velocity.
7. Design air flow.
8. Test (final) velocity.
9. Test (final) air flow.
10. Percent of design air flow.

O. Sound Level Reports:
1. in general sound test and report are not required when system sound level is accepted by Owner at a visual inspection. If the system/component has a sound problem, upon the request of Owner, the sound and report shall be performed to assist the Engineer and/or contractor to analyze the problem for resolution, at contractor's cost.
2. Location.
3. Octave bands - equipment off.
4. Octave bands - equipment on.

P. Vibration Tests:
1. In general vibration test is not required when system vibration level is accepted by Owner at a visual inspection. If the system/component has a sound problem, upon the request of Owner, the sound and report shall be performed to assist the Engineer and/or contractor to analyze the problem for resolution, at contractor's cost.
2. Location of points:
    a. Fan bearing, drive end.
    b. Fan bearing, opposite end.
    c. Motor bearing, center (if applicable).
    d. Motor bearing, drive end.
    e. Motor bearing, opposite end.
    f. Casing (bottom or top).
    g. Casing (side).
    h. Duct after flexible connection (discharge).
    i. Duct after flexible connection (suction).
3. Test readings:
    a. Horizontal, velocity and displacement.
    b. Vertical, velocity and displacement.
    c. Axial, velocity and displacement.
4. Normally acceptable readings, velocity and acceleration.
5. Unusual conditions at time of test.
6. Vibration source (if non-complying).

END OF SECTION

SECTION 230913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control panels.

B. Control Valves:
   1. Electronic operators.

C. HVAC&R Sensors:
   1. Temperature sensors.
   2. Humidity sensors.

D. Time clocks.

E. Sensors with transmitters:
   1. Building static pressure transmitters.

F. Control valves.

G. Automatic dampers.

H. Damper operators.

I. Time clocks.

J. Input/Output sensors.

K. Miscellaneous accessories.

1.02 RELATED REQUIREMENTS

A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

B. Section 262726 - Wiring Devices: Elevation of exposed components.

1.03 REFERENCE STANDARDS

A. NEMA BS 31032 - Residential Controls–Electrical Wall-Mounted Room Thermostats.

B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

D. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submit all submital documents listed in this Section under Section 230923 - Direct-Digital Control System for HVAC.

C. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

D. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences.
   1. Submit schedule of valves indicating size, flow, and pressure drop for each valve.
      a. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.
   2. Submit automatic dampers indicating arrangement, velocities, and static pressure drops for each system.
      a. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

E. Manufacturer's Instructions: Provide for all manufactured components.

F. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.05 QUALITY ASSURANCE

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty for contro valves.

PART 2 PRODUCTS

2.01 SYSTEM PERFORMANCE

A. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table below.

Measured Variable	Reported Accuracy
Space Temperature	±0.5ºC (±1ºF)
Ducted Air	±0.5ºC (±1ºF)
Outside Air	±1.0ºC (±2ºF)
Dew Point	±1.5ºC (±3ºF)
Water Temperature	±0.5ºC (±1ºF)
Delta-T	±0.15º (±0.25ºF)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (Accuracy applies to 10%–100% of scale)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (For both absolute and differential pressure)
Electrical	±1% of reading (Not including utility-supplied meters)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

B. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table below.

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0ºC (±2.0ºF)	
Duct Temperature	±1.5ºC (±3ºF)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

2.02 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.03 CONTROL PANELS

A. NEMA EN 10250, general purpose utility enclosures with enameled finished face panel.

B. Provide common keying for all panels.

2.04 CONTROL VALVES

A. Manufacturer:
   1. BELIMO.

B. Control Valves:
   1. Factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
   2. Sizing:
      a. Two-Position: Line size or size using a pressure differential of 1 psi.
      b. Two-Way Modulating: 5 psid or twice the load pressure drop, whichever is more.
      c. Three-Way Modulating: Twice the load pressure drop, but not more than 5 psid

C. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional (except as noted).

D. Pressure Independent Control Valves [Water Coil Optimization] (Also, see 2.16.F.2 for Pressure Independent Zone Valves.)
   1. NPS 2 and Smaller: Forged brass body rated at no less than 250 PSI, stainless steel ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc.
   2. NPS 2-1/2 through 6: GG25 cast iron body according to ANSI Class 125, standard class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring packing design, PTFE seats, and a stainless steel flow characterizing disc.
   3. Accuracy: The control valves shall accurately control the flow from 0 to 100% rated flow with an operating pressure differential range of 5 to 50 PSI differential across the valve with a valve body flow accuracy of +/- 5 total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis
   4. Flow Characteristics: Equal percentage characteristic.
   5. All actuators shall be capable of being electronically programmed in the field by use of external computer software or a dedicated handheld tool for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable.
   6. Water coil optimization shall be accomplished by utilizing a pressure independent control valve assembly; two temperature sensors providing feedback of coil inlet and outlet water temperatures; and an electronic flow meter to provide analog flow feedback. Software shall control the valve to avoid the coil differential temperature from falling below a programmed set point, The valve assembly shall be capable of accepting an analog signal representing the coil power required. Real-time data and configuration of valve operating parameters shall be available by means of BACnet MS/TP, BACnet/IP or HTTP. Monitored points shall include, but not be limited to inlet and outlet coil water temperatures, absolute flow, absolute valve position, absolute coil power and total heating/cooling energy in BTU/hr. Configuration points shall include but not be limited to valve, flow, and power settings. Historical trend data shall be stored for up to 13 months and be retrievable in a standard time-stamped format.
   7. The manufacturer shall provide a published commissioning procedure following the guidelines of the National Environmental Balancing Bureau (NEBB) and the Testing Adjusting Balancing Bureau (TABB).
   8. A wet calibrated electronic flow meter shall provide dynamic feedback to measure flow and verify performance.

9. The control valve shall require no maintenance and shall not include replaceable cartridges.

E. Characterized Control Valves:
   1. 3” and Smaller: Nickel-plated forged brass body rated at no less than 400 psi, stainless steel ball and blowout proof stem, female NPT end fittings, with a dual EPDM O-ring packing design, fiberglass reinforced Teflon seats, and a TEFZEL or stainless steel flow characterizing disc.
   2. 2-1/2” through 6”: GG25 cast iron body, ANSI 125, class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring package design, PTFE seats, and a stainless steel flow characterizing disc.
   3. Valve assemblies shall be maintenance free.
   4. NPS 2” and smaller characterized control valves shall be provided as part of a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a strainer/shut-off ball valve/drain with hose connection/[an integrated isolation ball valve/manual air vent with a P/T port. The return side of the coil shall contain a union fitting with a P/T port, characterized control valve, an integrated manual balancing valve/union/isolation ball valve/manual air vent with P/T port. Shut-off valves as an integrated part of the characterized control valve are prohibited. For 3-way installations, supply an integrated 100% port isolation valve/manual air vent with a P/T port for field installation in the bypass of the circuit . A 12” or 24” flexible hose set shall be provided for each coil supply and return connection for all pipe packages.

F. Zone Valves (two-position and modulating)
   1. Non-Pressure Independent Zone Valve
      a. NPS ½” and ¾”: Forged brass body rated at no less than 230 psi, chrome plated brass ball and stem, NPT female ends and EPDM O-rings. Valves utilizing flapper or paddle assemblies for flow control shall not be permitted.
   2. Flow Characteristic: Equal percentage (2-way) and Linear (3-way).
   3. Flow rating (Cv or gpm max) shall be field adjustable without the use of external devices. The control span shall adapt to the adjusted flow rating.
   4. The control valve shall require no maintenance and shall not include replaceable cartridges.

G. Globe valves shall have the following characteristics:
   1. Hydraulic system globe valves shall have the following characteristics:
      a. NPS 2 and Smaller: ANSI Class 250 bronze body, stainless steel stem, brass plug, bronze seat, and a TFE packing.
      b. NPS 2-1/2 and Larger: ANSI Class 125 [250] cast iron body, stainless steel stem, bronze plug, bronze seat, and a TFE V-ring packing.
      c. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
      d. Two- and three-way globe valves shall be used only if characterized control valves do not fit the sizing criteria or application.

H. Butterfly Valves - Resilient Seat:
   1. NPS 2 to 12: Valve body shall be full lugged ductile iron 200 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize an internal spline. The shaft shall be supported at four locations by RPTFE bushings. A coated disc shell is not acceptable.
   2. NPS 14 and Larger: Valve body shall be full lugged ductile iron 150 psig body with a 304 stainless steel disc, EPDM seat, extended neck and shall meet ANSI Class 125/150 flange standards. Disc-to-stem connection shall utilize a dual-pin method to prevent the disc from settling onto the liner. The shaft shall be supported at four locations by RPTFE bushings. A coated disc shell is not acceptable.
   3. Sizing: Two-Position (on/off) butterfly valves shall be sized using the 900 Cv rating. Modulating butterfly valves shall be sized using the 600 Cv rating.

4. Flow Characteristics: Modified equal percentage, unidirectional dead end service.
5. Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).
6. The combination of two 2-way butterfly valves in a tee configuration cross-linked to ensure proper flow orientation shall be permitted. The tee shall be constructed of cast iron/stainless steel.

I. Butterfly Valves - High Performance:
1. Valve body shall be full lugged carbon steel ANSI Class 150 [300] body with a 316 stainless steel disc without a nylon coating, RTFE seat, and be ANSI Class 150300 flange standards. Blowout-proof shaft shall be 17-4ph stainless steel and shall be supported at four locations by glass-backed TFE bushings. Valve packing shall be Chevron TFE and shall include fully adjustable packing flange and separable packing gland. Valve body shall have long stem design to allow for 2" insulation (minimum). Valve face-to-face dimensions shall comply with API 609 and MSS-SP-68. Valve assembly shall be completely assembled and tested, ready for installation.
2. Sizing: Two-Position (on/off) butterfly valves shall be sized using the 900 Cv rating. Modulating butterfly valves shall be sized using the 600 Cv rating.
3. Flow Characteristics: Modified equal percentage, full rated, bi-directional, dead end service with either flange removed.
4. Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).
5. Media Temperature Range: ANSI Class 150 [300] limitations.
6. Max Differential Pressure: 285 psi @ 100 deg F for ANSI 150 (725 psi @ 100 deg F for ANSI 300).
7. The combination of two 2-way butterfly valves in a tee configuration cross-linked to ensure proper flow orientation shall be permitted. The tee should be constructed of cast iron/stainless steel.

J. Water valves shall fail normally open or closed, as scheduled on plans, or as follows:
1. Water zone valves-normally open preferred.
2. Heating coils in air handlers-normally open.
3. Chilled water control valves-normally closed.
4. Other applications-as scheduled or as required by sequences of operation.

K. Electronic Operators:
1. Control valves shall be two-way or three-way type for two-position or modulating service as indicated.
2. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
3. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
    a. Water Valves:
        1) Two-way: 150% of total system (pump) head.
        2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
4. Select operator for full shut off at maximum pump differential pressure.
5. Signal and Range. Proportional actuators shall accept a 0-10 Vdc or a 0-20 mA control signal and shall have a 2-10 Vdc or 4-20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications)
6. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
7. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 60 in.-lb torque capacity shall have a manual crank.
8. Product:
    a. Belimo
    b. Industrial Actuators (Butterfly Valves)

2.05 CONTROL DAMPERS

A. See Section 233300 for dampers and this section for actuators and operators.

2.06 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
   1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
   2. Provide one operator for maximum 24 sq ft damper section.

2.07 HVAC&R SENSORS

A. Temperature Sensors:
   1. Use RTD (Resistance Temperature Device) type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
   2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
   3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
   4. Temperature Sensing Device: Compatible with project DDC controllers.
   5. Performance Characteristics:
      a. RTD:
         1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
         2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
         3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
         4) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
         5) Range: Minus 40 degrees F through 220 degrees F minimum.
      b. Thermistor:
         1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
         2) Range: Minus 25 degrees F through 122 degrees F minimum.
         3) Heat Dissipation Constant: 2.7 mW per degree C.
      c. Temperature Transmitter:
         1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
         2) Output: 4 to 20 mA.
      d. Sensing Range:
         1) Provide limited range sensors if required to sense the range expected for a respective point.
         2) Use RTD type sensors for extended ranges beyond minus 30 to 230 degrees F.
         3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
      e. Wire Resistance:
         1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
         2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
      f. Room Sensors: Locking cover as indicated on drawing.
      g. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
      h. Room Temperature Sensors:
         1) Construct for surface or wall box mounting.
         2) Provide the following:
            (a) Setpoint reset slide switch with an adjustable temperature range.
            (b) Momentary override request push button for activation of after-hours operation as indicated on drawing.

(c) Analog thermometer.

3) Product: BAPI; www.bapihvac.com

(a) Substitutions: See Section 01 6000 - Product Requirements.

i. Temperature Averaging Elements:

1) Use on duct sensors for ductwork 10 sq ft or larger.

2) Use averaging elements where prone to stratification with sensor length 8 ft or 16 ft.

3) Provide for all mixed air and heating coil discharge sensors regardless of duct size.

j. Insertion Elements:

1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches.

2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

k. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.

B. Humidity Sensors:

1. Drift: No more than 1% of full scale annually.
2. Room Sensors: Span of 20 - 80 percent relative humidity.
   a. Provide locking cove as indicated on drawing.
3. Duct and Outside Air Sensors: With element guard and mounting plate, range of 0 - 100 percent relative humidity.
   a. Duct Sensors: have a sampling chamber.
   b. Outside Air Sensors: suitable for ambient conditions of -40°F–170°F.

C. Static Pressure Sensors:

1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
3. Accuracy: One percent of full scale with repeatability 0.3 percent.
4. Output: 0 - 5 vdc with power at 12 to 28 vdc.

D. Equipment Operation Sensors:

1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 inches wg.
2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

E. Damper Position Indication: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 - 100 percent damper travel.

F. Carbon Monoxide Detectors:

1. Single or multichannel dual level detectors, using solid state sensors with three year minimum life. Sensor replacement shall take maximum 15 minutes. Suitable over temperature range of 23 to 130 degrees F.
2. Provide individual indicators and contractors for each level, initially calibrated for 50 ppm and 100 ppm.
3. Maximum response time to 100 ppm CO calibration gas: Two minutes.

G. Carbon Dioxide Sensors:

1. General: Provide non-dispersive infrared (NDIR) CO2 sensors with integral transducers and linear output.
   a. Linear, CO2 Concentration Range Display: 0 to 2000 ppm.

b. Full Scale Accuracy: Plus/minus 100 ppm or plus/minus 5 percent of reading which ever is higher.
c. Maximum Response Time: 1 minute.
d. Analog Output: 0-10 VDC.
e. Rated Ambient Conditions:
1) Air Temperature: Range of 32 to 122 degrees F.
2) Relative Humidity: Range of 0 to 95 percent (non-condensing).

2. Calibration Characteristics:
a. Automatically compensating algorithm for sensor drift due to sensor degradation.
b. Maximum Drift: 2 percent.
c. User calibratable with a minimum calibration interval of 5 years.

3. Construction:
a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.
b. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.

2.08 TIME CLOCKS

A. Seven day programming switch timer with synchronous timing motor and seven day dial, continuously charged Ni-cad battery driven power failure 8 hour carry over and multiple switch trippers to control systems for minimum of two and maximum of eight signals per day with two normally open and two normally closed output switches.

2.09 OVERRIDE TIMERS.

A. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0-6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

2.10 FLOW SWITCHES.

A. Flow-proving switches shall be paddle (water service only) or differential pressure type (air or water service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).

B. Paddle switches shall have adjustable sensitivity and NEMA 1 enclosure unless otherwise specified.

C. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

2.11 RELAYS.

A. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED “energized” indicator. Contact rating, configuration, and coil voltage shall be suitable for application.

B. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100% from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

2.12 SENSORS WITH TRANSMITTERS

A. Building Static Pressure Transmitters:
1. One pipe, direct acting, double bell, scale range 0.01 to 6.0 in-wc positive or negative, and sensitivity of 0.0005 in-wc. Transmit electronic signal to receiver with matching scale range.

B. Pressure Transmitters:
1. One pipe direct acting for gas, liquid, or steam service, range suitable for system, proportional electronic output.

C. Temperature Transmitters:

1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degrees F span and plus or minus 1 percent for 50 degrees F span, with 50 degrees F. temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig input pressure and 3 to 15 psig output.

D. Humidity Transmitters:
   1. One pipe, directly proportioned output signal to measured variable, linearity within plus or minus 1 percent for 70 percent relative humidity span, capable of withstanding 95 percent relative humidity without loss of calibration.

E. Current Transmitters.
   1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4-20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
   3. Unit shall be split-core type for clamp-on installation on existing wiring.

F. Voltage Transmitters.
   1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4-20 mA output with zero and span adjustment.
   2. Adjustable full-scale unit ranges shall be 100-130 Vac, 200-250 Vac, 250-330 Vac, and 400-600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
   3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

2.13 TRANSFORMERS

A. Current Transformers.
   1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
   2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
   3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

B. Voltage Transformers.
   1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
   2. Transformers shall be suitable for ambient temperatures of 4°C-55°C (40°F-130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
   3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

2.14 HYDRONIC FLOWMETERS

A. Insertion-Type Turbine Meter
   1. Dual counter-rotating axial turbine elements, each with its own rotational sensing system, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Single turbine for piping 2 inches and smaller. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag.
   2. Insertion type complete with ‘hot-tap’ isolation valves to enable sensor removal without water supply system shutdown.
   3. Sensing method shall be impedance sensing (non magnetic and non photoelectric)
   4. Volumetric accuracy
      a. ± 0.5% of reading at calibrated velocity
      b. ± 1% of reading from 3 to 30 ft/s (10:1 range)
      c. ± 2% of reading from 0.4 to 20 ft/s (50:1 range)

5. Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards which must be accurate to within 0.1% of flow rate and traceable to the National Institute of Standards and Technology (NIST).
6. Maximum operating pressure of 400 psi and maximum operating temperature of 200°F continuous (220°F peak).
7. All wetted metal parts shall be constructed of 316 stainless steel.
8. Analog outputs shall consist of non interactive zero and span adjustments, a DC linearly of 0.1% of span, voltage output of 0-10 Vdc, and current output of 4-20 mA.

2.15 CURRENT SWITCHES.

A. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.

2.16 PRESSURE TRANSDUCERS.

A. Transducers shall have linear output signal and field-adjustable zero and span.

B. Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.

C. Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4-20 mA output, suitable mounting provisions, and block and bleed valves.

D. Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.)Transducer shall have 4-20 mA output, suitable mounting provisions, and 5-valve manifold.

2.17 DIFFERENTIAL PRESSURE SWITCHES.

A. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

2.18 PRESSURE-ELECTRIC (PE) SWITCHES.

A. Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0-175 kPa (0-25 psig), with calibrated scale minimum setpoint range of 14-125 kPa (2-18 psig) minimum, UL listed.

B. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.

C. Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.

D. Each pneumatic signal line to PE switches shall have permanent indicating gauge.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats; see Section 262726.

C. Mount freeze protection thermostats using flanges and element holders.

D. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

E. Provide thermostats in aspirating boxes in front entrances.

F. Provide guards on thermostats in where indicated.

G. Provide valves with position indicators and with pilot positioners where sequenced with other controls.

H. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

I. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

J. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

K. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of .

L. Control Valve Installation
   1. Slip-stem control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position. Ball type control valves shall be installed with the stem in the horizontal position.
   2. Valves shall be installed in accordance with the manufacturer's recommendations.
   3. Control valves shall be installed so that they are accessible and serviceable and so that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
   4. Isolation valves shall be installed so that the control valve body may be serviced without draining the supply/return side piping system. Unions shall be installed at all connections to screw-type control valves.
   5. Provide tags for all control valves indicating service and number. Tags shall be brass, 1.5 inch in diameter, with ¼ inch high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

M. Control Damper Installation
   1. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.
   2. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.
   3. Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
   4. Install extended shaft or jackshaft according to manufacturer’s instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

5. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.
6. Provide a visible and accessible indication of damper position on the drive shaft end.
7. Support ductwork in area of damper when required to prevent sagging due to damper weight.
8. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

N. Installation of Sensors
1. Install sensors in accordance with the manufacturer's recommendations.
2. Mount sensors rigidly and adequately for environment within which the sensor operates.
3. Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.
4. All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.
5. Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.
6. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m2(1 ft2) of coil area.
7. Do not install temperature sensors within the vapor plume of a humidifier. If installing a sensor downstream of a humidifier, install it at least 3 m (10 ft) downstream.
8. All pipe-mounted temperature sensors shall be installed in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
9. Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.
10. Differential Air Static Pressure.
    a. Supply Duct Static Pressure. Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the height-pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.
    b. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Pipe the low-pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.
    c. Building Static Pressure. Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.
    d. The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.
    e. All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment.
    f. All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shut-off valves installed before the tee.
11. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.
12. Install humidity sensors for duct mounted humidifiers at least 3 m (10 ft) downstream of the humidifier. Do not install filters between the humidifier and the sensor.

O. Flow Switch Installation
   1. Use correct paddle for pipe diameter.
   2. Adjust flow switch according to manufacturer's instructions.

P. Actuators
   1. General. Mount and link control damper actuators according to manufacturer's instructions.
      a. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.
      b. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
      c. Provide all mounting hardware and linkages for actuator installation.
   2. Electric/Electronic
      a. Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer’s recommendations.
      b. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

Q. Control Damper Installation
   1. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.
   2. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.
   3. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.
   4. Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
   5. Install extended shaft or jackshaft according to manufacturer’s instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)
   6. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.
   7. Provide a visible and accessible indication of damper position on the drive shaft end.
   8. Support ductwork in area of damper when required to prevent sagging due to damper weight.
   9. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

END OF SECTION

SECTION 230923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230993 - Sequence of Operations for HVAC Controls.

C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.02 REFERENCE STANDARDS

A. ANSI/CEA 709.1.D - Control Network Protocol Specification.

B. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.

C. NFPA 70 - National Electrical Code.

D. UL (DIR) - Online Certifications Directory.

1.03 COODINATION REQUIREMENTS

A. Coordinate with HVAC equipment supplier and system field installer to clarly identify the following components to ensure the entire system meets the design intent:
   1. Interface requirment for HVAC equipment factory provided controllers.
   2. HVAC equipment factory supplied and installed control components.
   3. HVAC equipment factory installed control components.
   4. Field installed components.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data and Shop Drawing: Provide data and shop drawingfor each system hardware, software module and equipment to be installed or provided.
   1. DDC System Hardware
      a. A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
      b. Manufacturer’s description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
         1) Direct digital controllers (controller panels)
         2) Control panels
         3) Power supplies
         4) Batteries
         5) Operator interface equipment
         6) Wiring
      c. Wiring diagrams and layouts for each control panel. Show termination numbers.
      d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware. Riser diagrams
   2. Central System Hardware and Software
      a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical.
      b. Manufacturer’s description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
         1) Central Processing Unit (CPU) or web server
         2) Monitors
         3) Keyboards
         4) Power supplies

5) Battery backups
6) Interface equipment between CPU or server and control panels
7) Operating System software
8) Operator interface software
9) Color graphic software
10) Third-party software

c. Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.

d. Network riser diagrams of wiring between central control unit and control panels.

e. Controlled Systems
1) Riser diagrams showing control network layout, communication protocol, and wire types.
2) A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.
3) A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
4) An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
5) A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.
6) A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.
7) A point list for each control system. List I/O points and software points specified in Section 23 09 93. Indicate alarmed and trended points.

3. Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.
4. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.

C. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
1. Revise shop drawings to reflect actual installation and operating sequences.
2. Include submittals data in final "Record Documents" form.

E. Operation and Maintenance Data:
1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.06 OWNERSHIP OF PROPRIETARY MATERIAL

A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
   1. Graphics
   2. Record drawings
   3. Database
   4. Application programming code; software.
   5. Documentation

1.07 DEFINITION

A. BACnet Interoperability Building Blocks (BIBB): A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.

B. BACnet/BACnet Standard: BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.

C. Control Systems Server: A computer(s) that maintain(s) the systems configuration and programming database.

D. Controller: Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.

E. Direct Digital Control: Microprocessor-based control including Analog/Digital conversion and program logic.

F. Gateway: Bi-directional protocol translator connecting control systems that use different communication protocols.

G. Local Area Network: Computer or control system communications network limited to local building or campus.

H. Master-Slave/Token Passing: Data link protocol as defined by the BACnet standard.

I. Point-to-Point Serial communication as defined in the BACnet standard.

J. Primary Controlling LAN: High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.

K. Protocol Implementation Conformance Statement: A written document that identifies the particular options specified by BACnet that are implemented in a device.

L. Router: A device that connects two or more networks at the network layer.

M. Wiring: Raceway, fittings, wire, boxes and related items.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Automatic Controls Equipment Systems, automaticcontrols.net
   1. Local Representative: ACES, Justin Vogt, (314) 722-2727; jmvogt@automaticcontrols.net.

B. Substitutions: See Section 016000 - Product Requirements.

2.02 SYSTEM PERFORMANCE

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer’s recommended hardware and software for operator workstation (server and browser for web-based systems).
   1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
   2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec.and shall automatically refresh every 15 sec.

3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.

2.03 MATERIALS

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.04 COMMUNICATION

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.

B. Install new wiring and network devices as required to provide a complete and workable control network.

C. Use existing Ethernet backbone for network segments marked "existing" on project drawings.

D. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.

E. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
   1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
   2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.

F. Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.

G. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

H. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization(WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.

1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.05 CONTROLLERS

A. General:
   1. Provide an adequate number of the following as required to achieve performance specified in Section 230923 Article 2.03 (System Performance):
      a. Building Controllers (BC)
      b. Advanced Application Controllers (AAC)
      c. Application Specific Controllers (ASC)
      d. Smart Actuators (SA)
      e. Smart Sensors (SS)
   2. Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L.

B. BACnet.
   1. BCs: Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
   2. AACs: Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BTL Product Listing.
   3. ASCs: Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BTL Product Listing.
   4. SSs: Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BTL Product Listing.
   5. BACnet Communication.
      a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
      b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
      c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/ Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
      d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/ Physical layer protocol.
      e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
      f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication:

1. Service Port:
    a. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal.
        1) Connection shall be extended to space temperature sensor ports where shown on drawings.
2. Signal Management:
    a. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
3. Data Sharing:
    a. Each BC and AAC shall share data as required with each networked BC and AAC.
4. Stand-Alone Operation:
    a. Each piece of equipment specified in Section 230993 shall be controlled by a single controller to provide stand-alone control in the event of communication failure.
    b. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

D. Environment:
1. Controller hardware shall be suitable for anticipated ambient conditions:
    a. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -20°F to 140°F.
    b. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 32°F to 120°F.

E. Keypad and Display:
1. Provide a local keypad and display for each BC and AAC
2. Use for interrogating and editing data.
3. System security password prevents unauthorized use.

F. Real-Time Clock:
1. Controllers that perform scheduling shall have a real-time clock.

G. Serviceability:
1. Diagnostic LEDs for power, communication, and processor.
2. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation.
4. System shall continuously check controller network and generate alarm for each controller that fails to respond.

H. Memory:
1. Controller memory shall support operating system, database, and programming requirements.
2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.

I. Immunity to Power and Noise:
1. Maintain operation at 90 to 110 percent of nominal voltage rating.
2. Perform orderly shutdown below 80 percent of nominal voltage.
3. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

J. Transformer:
   1. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.06 INPUT AND OUTPUT INTERFACE

A. General:
   1. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.

B. Protection:
   1. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller.
   2. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.

C. Binary Inputs.
   1. Allow the monitoring of ON/OFF signals from remote devices.
   2. Provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against contact bounce and noise.
   3. Sense dry contact closure without application of power external to the controller.

D. Pulse Accumulation Inputs:
   1. Conform to binary input requirements and shall also accumulate up to 10 pulses per second.

E. Analog Inputs:
   1. Allow for monitoring low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals.
   2. Compatible with and field configurable to commonly available sensing devices.

F. Binary Outputs:
   1. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
   2. On building Controllers, outputs provided with three position (On/Off/Auto) override switches.
   3. Status lights for BCs and AACs to be selectable for normally open or normally closed operation.

G. Analog Outputs:
   1. Analog outputs shall not drift more than 0.4% of range annually.
   2. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
   3. Each BC and AAC analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer for manual override, and status lights.
   4. Drift to not exceed 0.4 percent of range per year.

H. Tri-State Outputs:
   1. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
   2. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
      a. VAV terminal units.
      b. Duct mounted heating coils.
      c. Zone dampers.
      d. Radiation.
   3. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

I. System Object Capacity:

1. System size to be expandable to at keast twice the number of input / output objects required providing additional controllers, including associated devices and wiring as necessary to achieve this capacity requirement.
2. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.07 AUXILIARY CONTROL DEVICES

A. Refer to Section 230913 - Instrumentation and Control Devices

2.08 WIRING AND RACEWAYS

A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.

B. Insulated wire shall use copper conductors and shall be UL listed for 200°F minimum service.

2.09 FIBER OPTIC CABLE SYSTEM

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.

B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3 EXECUTION

3.01 INSTALLERS

A. Installer List:
1. Automatic Controls Equipment Systems, Inc.http://www.automaticcontrols.net
2. Contact: Justin Vogt at 314-722-2972 or Robert Vogt at 314.722.2971

B. Substitution Limitations: Same as specified for products; see Section 016000 - Product Requirements.

3.02 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring installed prior to installation proceeding.

C. Examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequatem, or if any discrepancies occur between the plans and the contractor’s work and the plans and the work of others, report these discrepancies to the Owner and shall obtain written instructions for any changes necessary to accommodate the contractor’s work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by and at the expense of the contractor.

3.03 PROTECTION

A. The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.

B. The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.04 COORDINATION

A. Site

1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.

B. Submittals. See Section 23 09 23 Article 1.10 (Submittals).

C. Test and Balance.
1. Provide a qualified technician to assist in the test and balance process.

D. Life Safety (By Others).
1. Duct smoke detectors required for air handler shutdown are provided and controled under Division 28.
2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23 and are controled under Division 28.
3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
1. All communication media and equipment shall be provided as specified in Section 23 09 23 Article 2.2 (Communication).
2. Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 23 09 93.
3. The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
4. The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
5. The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.05 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.06 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 23 09 23 Article 1.8 (Codes and Standards).

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship.

C. Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

3.07 EXISTING EQUIPMENT

A. Wiring. Interconnecting control wiring shall be removed and shall become the property of the contractor unless specifically noted or shown to be reused.

B. Local Control Panels. Remove and deliver existing control panels to Owner.

C. Repair. Unless otherwise directed, the contractor is not responsible for repair or replacement of existing energy equipment and systems, valves, dampers, or actuators. Should the contractor find existing equipment that requires maintenance, the engineer is to be notified immediately.

D. Indicator Gauges. Where these devices remain and are not removed, they must be made operational and recalibrated to ensure reasonable accuracy.

E. Room Thermostats. Remove and deliver existing room thermostats to Owner unless otherwise noted. Patch and finish holes and marks left by removal to match existing walls.

F. Electronic Sensors and Transmitters. Remove and deliver existing sensors and transmitters to Owner.

G. Controllers and Auxiliary Electronic Devices. Remove and deliver existing controllers and auxiliary electronic devices to Owner.

H. Damper Actuators, Linkages, and Appurtenances. Remove and deliver existing damper actuators, linkages and appurtenances to Owner.

I. Control Valves. Replace existing control valves with new. Deliver removed control valves to Owner.

J. Control Compressed Air Systems. Replace existing control compressed air systems with new unless otherwise noted. Deliver removed systems to Owner.

K. Existing System Operating Schedule. Existing mechanical system may be disabled during this work.

L. The scheduling of fans through existing or temporary time clocks or control system shall be maintained throughout the DDC system installation

M. Install control panels where shown.

N. Modify existing starter control circuits, if necessary, to provide hand-off-auto control of each controlled starter. If new starters or starter control packages are required, these shall be included as part of this contract.

O. Patch holes and finish to match existing walls.

3.08 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.

B. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.

C. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.

E. All wiring in mechanical, electrical, or service rooms - or where subject to mechanical damage - shall be installed in raceway at levels below 3 m (10ft).

F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).

G. Do not install wiring in raceway containing tubing.

H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.

I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.

J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.

M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.

N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

O. Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer’s recommendations and NEC requirements, except as noted elsewhere.

P. Include one pull string in each raceway 2.5 cm (1 in.) or larger.

Q. Use color-coded conductors throughout with conductors of different colors.

R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

S. Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).

T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

U. Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.

V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.

W. The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

X. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

3.09 COMMUNICATION WIRING

A. The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling

C. Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.

D. Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.

F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer’s instructions.

G. All runs of communication wiring shall be unspliced length when that length is commercially available.

H. All communication wiring shall be labeled to indicate origination and destination data.

I. Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

J. BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:
   1. The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
   2. The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
   3. The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
   4. An MS/TP EIA-485 network shall have no T connections.

3.10 FIBER OPTIC CABLE

A. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.

B. All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

3.11 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 230993.

C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.

D. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of .

3.12 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

3.13 WARNING LABELS

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.
   1. Labels shall use white lettering (12-point type or larger) on a red background.
   2. Warning labels shall read as follows.

C A U T I O N

THIS EQUIPMENT IS OPERATING UNDER AUTOMATIC CONTROL AND MAY START OR STOP AT ANY TIME WITHOUT WARNING. SWITCH DISCONNECT TO"OFF"POSITION BEFORE SERVICING.

B. Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
   1. Labels shall use white lettering (12-point type or larger) on a red background.
   2. Warning labels shall read as follows.

C A U T I O N

THIS EQUIPMENT IS FED FROM MORE THAN ONE POWER SOURCE WITH SEPARATE DISCONNECTS. DISCONNECT ALL POWER SOURCES BEFORE SERVICING.

3.14 IDENTIFICATION OF HARDWARE AND WIRING

A. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.

B. All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.

C. Permanently label or code each point of field terminal strips to show the instrument or item served.

D. Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.

E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.

F. Identify room sensors related to terminal boxes or valves with nameplates.

G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.

H. Identifiers shall match record documents.

3.15 CONTROLLERS

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.

B. Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 23 09 93 (Sequences of Operation).

3.16 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and trend logging.

B. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 23 09 93 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 23 09 93 may be used. Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

C. Software Programming.
   1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
      a. Text-based:
         1) Must provide actions for all possible situations
         2) Must be modular and structured
         3) Must be commented
      b. Graphic-based:
         1) Must provide actions for all possible situations
         2) Must be documented
      c. Parameter-based:
         1) Must provide actions for all possible situations
         2) Must be documented.

D. Operator Interface.
   1. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 230993.
   2. The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

3.17 CONTROL SYSTEM CHECKOUT AND TESTING

A. Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner’s representative is notified of the system demonstration.
   1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
   2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
   3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers’ recommendations.
   4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.

5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
7. Alarms and Interlocks:
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.18 CLEANING

A. The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.19 TRAINING

A. Provide training for a designated staff of Owner’s representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

3.20 CONTROLS COMMUNICATION PROTOCOL

A. General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ANSI/ASHRAE Standard 135 (BACnet). Controllers shall communicate with other BACnet objects on the internetwork using the Read (Execute) Property service as defined in Clause 15.5 of Standard 135.

B. Distributed Processing. The controller shall be capable of stand-alone operation and shall continue to provide control functions if the network connection is lost.

C. I/O Capacity. The controller shall contain sufficient I/ O capacity to control the target system.

D. The Controller shall have a physical connection for a laptop computer or a portable operator’s tool.

E. Environment. The hardware shall be suitable for the anticipated ambient conditions.
    1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 40°C to 60°C (40°F to 140°F).
    2. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

F. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.

G. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 30 days.

H. Power. Controller shall be able to operate at 90% to 110% of nominal voltage rating.

I. Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption and shall be fused or current limiting type.

3.21 START-UP AND CHECKOUT PROCEDURES

A. Start up, check out, and test all hardware and software and verify communication between all components.
   1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
   2. Verify that all analog and binary input/output points read properly.
   3. Verify alarms and interlocks.
   4. Verify operation of the integrated system.

3.22 SEQUENCES OF OPERATION

A. See Section 230993 - Sequences of Operation, With Points Lists.

END OF SECTION

SECTION 230993
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of operation for:

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 230923 - Direct-Digital Control System for HVAC.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Submit all submittal documents listed in this Section under Section 230923 - Direct-Digital Control System for HVAC.

C. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
   1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
   2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
   3. Include at least the following sequences:
      a. Start-up.
      b. Warm-up mode.
      c. Normal operating mode.
      d. Unoccupied mode.
      e. Shutdown.
      f. Capacity control sequences and equipment staging.
      g. Temperature and pressure control, such as setbacks, setups, resets, etc.
      h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
      i. Effects of power or equipment failure with all standby component functions.
      j. Sequences for all alarms and emergency shut downs.
      k. Seasonal operational differences and recommendations.
      l. Interactions and interlocks with other systems.
   4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
   6. Include schedules, if known.

D. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
   1. Label with settings, adjustable range of control and limits.
   2. Include flow diagrams for each control system, graphically depicting control logic.

3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
5. Include all monitoring, control and virtual points specified in elsewhere.
6. Include a key to all abbreviations.

E. Points List: Submit list of all control points indicating at least the following for each point.
1. Name of controlled system.
2. Point abbreviation.
3. Point description; such as dry bulb temperature, airflow, etc.
4. Display unit.
5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
8. Calculated point (Yes / No); i.e. a “virtual” point generated from calculations of other point values.

F. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SINGLE ZONE ROOFTOP UNIT, VARIABLE AIR VOLUME, DX OR CHILLED WATER COOLING, NATURAL GAS OR ELECTRIC HEATING

A. Run Conditions - Scheduled:
1. The unit shall run according to a user definable time schedule in the following modes:
2. Occupied Mode: The unit shall maintain
a. 75 °F (adj.) cooling setpoint
b. 70 °F (adj.) heating setpoint.
c. Fan: run continuously.
3. Unoccupied Mode (night setback): The unit shall maintain
a. 82 °F (adj.) cooling setpoint.
b. 60 °F (adj.) heating setpoint.
c. Fan: run only when heating or cooling or economizer is activated to maintain the maintain the space temperature setpoint.
4. Alarms shall be provided as follows:
a. High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).
b. Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

B. Zone Setpoint Adjust:
1. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

C. Zone Optimal Start:
1. The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

D. Zone Unoccupied Override:

1. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

E. Supply Fan:
   1. Alarms shall be provided as follows:
      a. Supply Fan Failure: Commanded on, but the status is off.
      b. Supply Fan in Hand: Commanded off, but the status is on.
      c. Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

F. Zone Temperature Control:
   1. The controller shall measure the zone temperature and shall modulate the supply fan VFD speed and stage the heating or cooling to maintain zone temperature setpoint. The supply fan VFD speed shall not drop below 30 % (adj.) or required ventilation air which even is greater. The fan speed shall increase as the zone temperature rises above cooling setpoint, or as the zone temperature drops below heating setpoint. The supply fan VFD speed shall not drop below 30 % (adj.) or required ventilation air which even is greater.
      a. Cooling mode:
         1) The fan speed shall increase as the zone temperature rises above cooling setpoint while the cooling is staged to maintain cooling discharge air temperature at 55 F degree.
         2) When space temperature is below setpoint and fan speed reaches the minimum fan speed, the cooling shall be cycled off to maintain the space temperature setpoint.
      b. Heating Mode:
         1) The fan speed shall increase as the zone temperature drops below heating setpoint while the heating is stage maintain the heating discharge air temperature set point.
            (a) When OAT > = 65 F degree, DAT setpoint = 80 F degree (adj.).
            (b) When OAT < 65 F degree, DAT setpoint = 90 F degree (adj.).
         2) When space temperature is below setpoint and fan speed reaches the minimum fan speed, the heating shall be cycled off to maintain the space temperature setpoint.

G. Enthalpy Wheel - Constant Speed: The controller shall run the enthalpy wheel for energy recovery as follows:
   1. Cooling Mode:
      a. The enthalpy wheel shall run for full cool recovery (hot humid days) whenever:
         1) The outside air enthalpy is greater than the return air enthalpy.
         2) AND the zone temperature is above cooling setpoint.
         3) AND the supply fan is on.
      b. The enthalpy wheel shall run for partial cool recovery (hot dry days) whenever:
         1) The outside air humidity ratio is less than the return air humidity ratio
         2) AND the outside air temperature is greater than the return air temperature
         3) AND the unit discharge air drybulb does not drop below the enthalpy wheel supply air dewpoint
         4) AND the zone temperature is above cooling setpoint
         5) AND the supply fan is on.
   2. Heating Mode:
      a. The enthalpy wheel shall run for full heat recovery whenever:
         1) Outside air enthalpy is less than return air enthalpy
         2) AND the outside air temperature is less than the return air temperature
         3) AND the zone temperature is below heating setpoint.
         4) AND the supply fan is on.
   3. Periodic Self-Cleaning:

a. The enthalpy wheel shall run for 20 sec (adj.) every 24 hr (adj.) the unit runs.

4. Frost Protection:
   a. The enthalpy wheel shall run for 10 sec (adj.) every 600 sec (adj.) whenever:
   b. Outside air temperature drops to within 2 °F (adj.) of the enthalpy wheel supply air dewpoint when outside air temperature is below 35 F (adj.).
   c. OR the exhaust air temperature drops below 25 °F (adj.).
5. The bypass dampers shall open whenever the enthalpy wheel is disabled.
6. Alarms shall be provided as follows:
   a. Enthalpy Wheel Rotation Failure: Commanded on, but the status is off.
   b. Enthalpy Wheel in Hand: Commanded off, but the status is on.
   c. Enthalpy Wheel Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

H. Cooling Stages (DX):
1. The controller shall measure the zone temperature and stage the cooling to maintain unit discharge air temperature or zone cooling setpoint per zone temperature control sequence. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.
2. The cooling shall be enabled whenever:
   a. Outside air temperature is greater than 60 °F (adj.).
   b. AND the economizer (if present) is disabled or fully open.
   c. AND the zone temperature is above cooling setpoint.
   d. AND the supply fan status is on.
   e. AND the heating is not active.
3. For digital lead compressor: start the digital compressor at full capacity for one minute (This allows stabilizing the oil return at start of compressor and preventing from pre-mutual compressor failure), then modulate to match the load.

I. Cooling Coil Valve:
1. The controller shall measure the zone temperature and modulate the cooling coil valve to maintain unit discharge air temperature or zone cooling setpoint per zone temperature control sequence.
2. The cooling shall be enabled whenever:
   a. Outside air temperature is greater than 60 °F (adj.).
   b. AND the economizer (if present) is disabled or fully open.
   c. AND the zone temperature is above cooling setpoint.
   d. AND the supply fan status is on.
   e. AND the heating is not active.

J. Gas Heating Modulate:
1. The controller shall measure the zone temperature and modulate the gas valve to maintain unit discharge air temperature or zone heating setpoint per zone temperature control sequence. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.
2. The heating shall be enabled whenever:
   a. Outside air temperature is less than 55 °F (adj.).
   b. AND the zone temperature is below heating setpoint.
   c. AND the supply fan status is on.
   d. AND the cooling is not active.
   e. Supply Fan is at minimum cooling air flow; Supply air shall be heating air flow when heating is energized.

K. Economizer:

1. The controller shall measure the zone temperature and modulate the economizer dampers in sequence to maintain a setpoint 2 °F less than the zone cooling setpoint. The outside air dampers shall maintain a minimum adjustable position, determined by field testing and balancing, (adj.) open whenever occupied.
2. The economizer shall be enabled whenever:
    a. Outside air temperature is less than 65 °F (adj.).
    b. AND the outside air enthalpy is less than the return air enthalpy.
    c. AND the supply fan status is on.
3. The economizer shall close whenever:
    a. Mixed air temperature drops from 45 °F to 40 °F (adj.).
    b. OR on loss of supply fan status.
    c. OR the freezestat (if present) is on.

L. The outside and exhaust air dampers shall close and the return air damper shall open when the unit is off. If Optimal Start Up is available, the mixed air damper shall operate as described in the occupied mode except that the outside air damper shall modulate to fully closed.

M. Minimum Outside Air Ventilation - Carbon Dioxide (CO2) Control:
1. When in the occupied mode, the space CO2 sensor shall control the Outside Air Ventilation between System Maximum Ventilation and System Minimum Ventilation to maintain the zone CO2 concentration within 1000 PPM.
2. Normal Mode:
    a. When zone CO2 sensor concentration is below setpoint, 750 PPM (adj.). The AHU OA damper shall be modulated to close with a time delay ramp that gradually goes from System Maximum Ventilation position to System Minimum Ventilation position over a 20 minute period.
        1) During this time, if the zone CO2 concentration reaches 900 ppm, the OA damper shall remain at the present position.
        2) When zone CO2 reaches 1000 ppm, the AHU/RTU shall goes to DVC Mode.
3. DVC Mode:
    a. DVC Control shall be activated when the zone CO2 concentration is over setpoint, 1000 PPM (adj.).
    b. The OA damper shall be modulated open with a time delay ramp that gradually goes from System Minimum Ventilation position to System Maximum Ventilation position over a 20 minutes period.
        1) During this time, if zone CO2 concentration drops below 750 ppm, the AHU/RTU shall return to Normal Mode.
4. Alarms shall be provided as follows:
    a. High Zone Carbon Dioxide Concentration: If the highest zone CO2 concentration is greater than 1200 ppm (adj.).

N. Dehumidification:
1. The controller shall measure the return air humidity and override the cooling sequence to maintain return air humidity at or below 60 % rh (adj.). Dehumidification shall be enabled whenever the supply fan status is on.
    a. Dehumidification shall run till the return air humidity at or below 60 % rh (adj.).

O. Mixed Air Temperature:
1. The controller shall monitor the mixed air temperature and use as required for economizer control (if present) or preheating control (if present).

P. Return Air Humidity:
1. The controller shall monitor the return air humidity and use as required for economizer control (if present) or humidity control (if present).

Q. Return Air Temperature:
1. The controller shall monitor the return air temperature and use as required for economizer control (if present).

R. Supply Air Temperature:
   1. The controller shall monitor the supply air temperature.

3.02 VAV ROOFTOP UNIT/AHU, DX OR CHILLED WATER COOLING, NATURAL GAS OR ELECTRIC OR WATER HEATING

A. Run Conditions - Scheduled:
   1. The unit shall run based upon an operator adjustable schedule.
   2. When the unit is OFF:
      a. Outside air damper: Fully closed.
      b. Relief air damper: Fully closed.
      c. Return air damper: Fully open.
      d. Supply fans: Off
      e. Return/Relief Fan, as applicable: Off
   3. When the unit is ON at Occupied Mode, 5 minutes delay open the outside air damper to its minimum air flow position after start the supply, and return/relief fans as applicable.
   4. Maintain OA damper closed at Morning Warm Up, and Unoccupied Modes.
   5. During unoccupied mode, the unit shall run when:
      a. 20% zones call for cooling.
      b. Any zone calls for heating.

B. AHU Optimal Start:
   1. The unit shall start prior to scheduled occupancy based on the time necessary for the zones to reach their occupied setpoints. The start time shall automatically adjust based on changes in outside air temperature and zone temperatures.

C. Supply Fan:
   1. The supply fan shall run anytime when the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.
   2. Alarms shall be provided as follows:
      a. Supply Fan Failure: Commanded on, but the status is off.
      b. Supply Fan in Hand: Commanded off, but the status is on.
      c. Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

D. Supply Air Duct Static Pressure Control:
   1. The controller shall measure duct static pressure and modulate the supply fan VFD speed to maintain a duct static pressure setpoint. The speed shall not drop below 30% (adj.). The static pressure setpoint shall be reset based on zone cooling requirements.
      a. The initial duct static pressure setpoint shall be in 1.0 inch H2O (adj.).
      b. As cooling demand increases, the setpoint shall incrementally reset up to a maximum of in 1.5 inch H2O (adj.).
      c. As cooling demand decreases, the setpoint shall incrementally reset down to a minimum of in 0.5 inch H2O (adj.).
      d. Adjust the setpoint per final testing and balancing result.
   2. Alarms shall be provided as follows:
      a. High Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) greater than setpoint.
      b. Low Supply Air Static Pressure: If the supply air static pressure is 25% (adj.) less than setpoint.
      c. Supply Fan VFD Fault.

E. Return Fan:
   1. The return fan shall run whenever the supply fan runs.
   2. The return fans speed shall be synchronized with the supply fans speed.
   3. Alarms shall be provided as follows:
      a. Return Fan Failure: Commanded on, but the status is off.

b. Return Fan in Hand: Commanded off, but the status is on.
c. Return Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).
d. Return Fan VFD Fault.

F. Heat Recovery Wheel - Constant Speed:
1. The controller shall run the heat recovery wheel for energy recovery as follows.
a. Cooling Recovery Mode:
1) The controller shall measure the heat wheel discharge air temperature and run the heat wheel to maintain a setpoint 2°F (adj.) less than the unit supply air temperature setpoint. The heat wheel shall run for cool recovery whenever:
(a) The unit return air temperature is 5°F (adj.) or more below the outside air temperature.
(b) AND the unit is in a cooling mode.
(c) AND the economizer (if present) is off.
(d) AND the supply fan is on.
b. Heating Recovery Mode:
1) The controller shall measure the heat wheel discharge air temperature and run the heat wheel to maintain a setpoint 2°F (adj.) greater than the unit supply air temperature setpoint. The heat wheel shall run for heat recovery whenever:
(a) The unit return air temperature is 5°F (adj.) or more above the outside air temperature.
(b) AND the unit is in a heating mode.
(c) AND the economizer (if present) is off.
(d) AND the supply fan is on.
2. Periodic Self-Cleaning:
a. The heat wheel shall run for 20 sec (adj.) every 24 hr (adj.) the unit runs.
3. Frost Protection:
a. The heat wheel shall run for 20 sec (adj.) every 600 sec (adj.) whenever:
1) Outside air temperature drops below 15°F (adj.)
2) OR the exhaust air temperature drops below 20°F (adj.).
4. The heat wheel bypass dampers will open whenever the heat wheel is disabled.
5. Alarms shall be provided as follows:
a. Heat Wheel Rotation Failure: Commanded on, but the status is off.
b. Heat Wheel in Hand: Commanded off, but the status is on.
c. Heat Wheel Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

G. Supply Air Temperature Setpoint - Optimized:
1. The controller shall monitor the supply air temperature and shall maintain a supply air temperature setpoint reset based on zone cooling and heating requirements
2. The supply air temperature setpoint shall be reset for cooling based on zone cooling requirements as follows:
a. Occupied Cooling Mode:
1) When outside air dewpoint is above 56 °F (adj.):
(a) Supply air temperature setpoint shall be 55°F (adj.)
2) When outside air dewpoint is at or below 56 °F (adj.):
(a) The initial supply air temperature setpoint shall be 60°F (adj.).
(b) As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).
(c) As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 65°F (adj.).
b. Unoccupied Cooling Mode:
1) Supply air temperature shall be at 65 °F (adj.).
2) Modulate cooling valve to maintain the supply air temperature cooling set point.
c. Preheating Mode:

1) When mixing air temperature is below 52 °F (adj.), modulate heating coil valve to maintain supply air temperature at set point 60 °F (adj.).

H. Cooling Mode:
   1. The cooling shall be enabled whenever:
      a. Outside air temperature is greater than 55°F (adj.).
      b. AND the supply fan status is on.
      c. AND the heating (if present) is not active.
   2. Modulate cooling valve to maintain the supply air temperature cooling set point.

I. Preheating Mode:
   1. The preheating shall be enabled whenever:
      a. Mixing air temperature is less than 52°F (adj.).
      b. AND the supply fan status is on.
      c. AND the cooling is Off.
      d. AND economizer is disabled.
   2. Modulate preheating valve to maintain the supply air temperature cooling set point.

J. Alarms shall be provided as follows:
   1. High Supply Air Temp: If the supply air temperature is 5°F (adj.) greater than setpoint.
   2. Low Supply Air Temp: If the supply air temperature is 5°F (adj.) less than setpoint.

K. Economizer:
   1. The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain a setpoint 2°F (adj.) less than the supply air temperature setpoint. The outside air dampers shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.
   2. The economizer shall be enabled whenever:
      a. The outside air enthalpy is less than 27 Btu/lb (adj.) (Enthalpy of 75°F DB / 50%RH is 28.1 Btu/lb; 55°F DB / 100%RH is 23.2 Btu/lb)
      b. AND the supply fan status is ON (both occupied mode and unoccupied mode)
      c. AND the supply fan status is on.
   3. The economizer shall close whenever:
      a. Mixed air temperature drops from 40°F to 35°F (adj.)
      b. OR the freezestat (if present) is on.
      c. OR on loss of supply fan status.
   4. Modulate mixed air damper to maintain the supply air temperature setpoint described in paragraph Supply Air Temperature Setpoint - Optimized.
      a. When the economizer is at 100% open and is insufficient to maintain the Supply Air Temperature Setpoint, modulate chilled water valve to maintain the Supply Air Temperature.
   5. Economizer shall be applied to both occupied mode and unoccupied mode.

L. Minimum Outside Air Ventilation - Carbon Dioxide (CO2) Control:
   1. BAS shall monitor all zone CO2 sensors. The CO2 sensors shall control the Outside Air Ventilation between System Maximum Ventilation and System Minimum Ventilation to maintain all zone CO2 concentration within 1100 PPM.
   2. Normal Mode:
      a. When all zone CO2 sensor readings are below setpoint, 750 PPM (adj.). The AHU OA damper shall be modulated to close with a time delay ramp that gradually goes from System Maximum Ventilation position to System Minimum Ventilation position over a 20 minute period.
         1) During this time, if any zone CO2 reaches 900 ppm, the OA damper shall remain at the present position.
         2) When any zone CO2 reaches 1100 ppm, the AHU/RTU shall goes to DVC Mode.
   3. DVC Mode:

a. DVC Control shall be activated when:
1) any zone CO2 sensor is over setpoint, 1100 PPM (adj.).
2) And its VAV box is at minimum cooling CFM or above for at least 5 minimums (adj..) at cooling mode,
3) Or VAV box is at heating CFM for at least 5 minimums (adj.) at heating mode.
b. The OA damper shall be modulated open with a time delay ramp that gradually goes from System Minimum Ventilation position to System Maximum Ventilation position over a 20 minute period.
1) During this time, if all zone CO2 drops below 750 ppm, the AHU/RTU shall return to Normal Mode.

4. DDC controller shall monitor the total supply air CFM that shall never drop below 30% setpoint (adj.). Open each VAV up to 30% for proper supply fan operation at minimum fan air flow condition.
5. Alarms shall be provided as follow:
a. High Zone Carbon Dioxide Concentration: any zone CO2 concentration is greater than 1400 ppm (adj.).

M. Mixed Air Temperature:
1. The controller shall monitor the mixed air temperature and use as required for economizer control (if present) and preheating control (if present).

N. Return Air Humidity:
1. The controller shall monitor the return air humidity and use as required for economizer control (if present) or humidity control (if present).

O. Return Air Temperature:
1. The controller shall monitor the return air temperature and use as required for setpoint control or economizer control (if present).

P. Supply Air Temperature:
1. The controller shall monitor the supply air temperature.
2. Alarms shall be provided as follows:
a. High Supply Air Temp: If the supply air temperature is greater than 75°F (adj.), except in morning warm up mode.
b. Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Q. OA Flow Station:
1. BAS shall monitor the CFM of OA Flow Station.
2. Alarms shall be provided as follows:
a. High OA CFM: If OA CFM is 15% greater than setpoint (adj.).
b. Low OA CFM: If OA CFM is 15% less than setpoint (adj.).

3.03 RADIANT PANELS

A. Single temperature thermostat maintains constant space temperature set at 75 degrees F during the day and 60 degrees F cooler at night by modulating two-way control heating valve with spring range of 3 to 7 psig.

3.04 TERMINAL AIR UNITS

A. Run Conditions - Scheduled:
1. The unit shall run according to a user definable time schedule in the following modes:
a. Occupied Mode: The unit shall maintain
1) A 75°F (adj.) cooling setpoint
2) A 70°F (adj.) heating setpoint.
b. Unoccupied Mode (night setback): The unit shall maintain
1) A 82°F (adj.) cooling setpoint.
2) A 60°F (adj.) heating setpoint.
2. Alarms shall be provided as follows:

a. High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.).
b. Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.).

B. Zone Setpoint Adjuster:
1. The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

C. Zone Optimal Start:
1. The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

D. Zone Unoccupied Override (Selected Zone as Indicated on Drawing, if applicable):
1. A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

E. Reversing Variable Volume Terminal Unit - Flow Control:
1. Occupied Cooling Mode:
a. Zone damper shall be modulating between maximum occupied CFM (adj.) and minimum occupied CFM (adj.) to maintain the zone cooling temperature setpoint.
b. When space temperature is within the dead band (setpoint +- 1, adj.), the respective zone VAV shall remain at current CFM setpoint to provide matching demand cooling capacity.
2. Occupied Reheating Mode:
a. Conditions to enable the unoccupied reheating mode:
1) OA temperature > 60°F, adj., and
2) the zone CFM reaches cooling minimum set point, and
3) space temperature is below its heating setpoint
b. The VAV CFM shall remain at cooling minimum set point.
c. The heating water valve shall modulate to maintain the zone heating temperature setpoint.
d. The discharge air temperature shall be at 70°F (adj.) or below depending the heating water valve position that can satisfy the zone heating temperature setpoint.
e. When zone temperature is within the dead band (setpoint +- 1, adj.), the zone damper and heating valve shall remain at current positions to provide matching demand capacity.
f. Alarms shall be provided when: the discharge air temperature is above 75°F (adj.)
1) the discharge air temperature is above 75°F (adj.)
3. Occupied Heating Mode (When OA temperature <= 60°F):
a. Conditions to enable the unoccupied reheating mode:
1) OA temperature <= 60°F, and
2) zone CFM reaches cooling minimum set point, and
3) zone temperature is below its heating setpoint.
b. VAV shall operate with the following sequences:
1) The zone CFM shall remain at cooling minimum set point initially.
2) The heating water valve shall modulate to maintain the zone heating temperature setpoint;
3) The discharge air temperature shall be at or below the designed heating discharge air temperature, depending on the position that can satisfy the zone heating temperature set point.
4) When the discharge air temperature reaches the maximum design discharge air temperature and zone temperature is still below the zone heating setpoint:

(a) Modulate VAV air damper and gradually increase the CFM up to Maximum heating CFM to maintain the zone heating temperature.
(b) Modulating the heating control valve to maintain the maximum design heating discharge air temperature.

c. When zone temperature is within the dead band (setpoint +- 1, adj.), the VAV CFM and heating valve shall remain at current positions to provide matching demand capacity.
d. Reverse the cycle above when zone temperature is above zone heating setpoint.

4. Occupied - CO2 Ventilation (OA CFM) Control:
   a. When individual zone CO2 level is below setpoint (900 PPM, adj.), zone CFM is allowed to go down to 15% (adj.) of design full flow of cooling to satisfy the zone temperature setpoint.
   b. When individual zone CO2 level is between 900 PPM, adj. to 1100 PPM:
      1) The CO2 sensor shall override the temperature sensor to remain zone CFM at current CFM to maintain the zone CO2 level.
      2) Enable the heating or the reheating mode, as needed, to satisfy the zone heating temperature setpoint.
   c. When individual CO2 sensor is above its setpoint, 1100 PPM (adj.), the CO2 sensor shall override the temperature sensor to increase the zone CFM gradually to maintain zone CO2 level at 1100 PPM:
      1) At heating mode, increase the zone CFM up to design heating CFM.
      2) At cooling or reheat Mode, increase the zone CFM up to design cooling CFM
      3) Enable heating or reheating mode as needed to stratify the zone heating temperature setpoint.
5. Unoccupied Mode:
   a. Unoccupied Cooling Mode:
      1) (When 20% (adj.) of zones call for cooling, AHU/RTU shall be enabled. Set AHU discharge air temperature at 65 F degree , adj during unoccupied mode - Refer AHU/RTU operating sequence.)
      2) Zone damper shall be modulated to maintain the zone unoccupied cooling temperature setpoint.
      3) Turn off AHU/RTU when < 15% (adj.) of zones calls for cooling.
   b. Unoccupied Heating Mode:
      1) (When any zone calls for heating, AHU or RTU shall be enabled. Maintain AHU discharge air temperature 60 f degree or above; remain AHU heating off when return air temperature is 60 f degree or above. Refer to AHU/RTU sequence of operation.)
      2) The zone heating CFM shall remain at minimum heating CFM initially.
      3) The zone heating valve shall modulate to satisfy the zone heating temperature setpoint. The discharge air temperature shall be up to designed heating discharge air temperature.
      4) After zone discharge air temperature reaches maximum heating discharge temperature and the zone continues calling for heating:
         (a) Modulate zone damper up to designed maximum heating cfm to maintain zone heating temperature setpoint.
         (b) Modulate zone heating water valve to maintain the designed discharge air temperature.
      5) Reverse the cycle above when the zone temperature is above unoccupied zone heating setpoint.
      6) Turn off AHU/RTU when all zone CFM is at minimum position and heating valve is fully closed.

F. Discharge Air Temperature:
   1. Alarms shall be provided as follows:

a. High Discharge Air Temp: If the discharge air temperature is greater than 5°F (adj.) above setpoint.
b. Low Discharge Air Temp: If the discharge air temperature is less than 5°F (adj.) below setpoint.

G. The controller shall monitor the zone discharge air temperature, zone CFM, zone heating valve position, zone temperature; and display them on VAV graphic. Display AHU/RTU discharge air temperature as VAV inlet air temperature on VAV graphic

3.05 EXHAUST FANS

A. Run Conditions - Scheduled:
1. The fan shall run according to a user definable schedule.

B. Fan Status:
1. The controller shall monitor the fan status.

C. Alarms shall be provided as follows:
1. Fan Failure: Commanded on, but the status is off.
2. Fan in Hand: Commanded off, but the status is on.

END OF SECTION

SECTION 232500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.
   1. System cleaner.

1.02 RELATED REQUIREMENTS

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.

E. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

F. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.
   1. Refill with clean water and repeat until system cleaner is removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
   1. Provide minimum of two hours of instruction for two people.
   2. Have operation and maintenance data prepared and available for review during training.
   3. Conduct training using actual equipment after treated system has been put into full operation.

3.04 MAINTENANCE

A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.

B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.

C. Provide monthly technical service visits to perform field inspections and make water analysis on-site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.

D. Provide laboratory and technical assistance services during this maintenance period.

E. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION

SECTION 260505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

1.03 SUBMITTALS

A. No submittals required.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on field observation and existing record documents.

D. Report discrepancies to Owner before disturbing existing installation.

E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Verify field loads on circuits identified for demolition.

B. Disconnect electrical systems in walls, floors, and ceilings to be removed.

C. Coordinate utility service outages with utility company.

D. Provide temporary wiring and connections to maintain existing systems in service during construction.

E. When electrical demolition work must be performed on energized equipment or circuits, use personnel experienced in such operations.

F. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Make notifications at least 48 hours in advance.
   3. Make temporary connections to maintain service in areas adjacent to work area.

G. Existing Telephone, Data Network, Public Address, Video Surveillance, and Security Systems: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner at least 48 hours before partially or completely disabling system.
   2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

E. Disconnect and remove abandoned panelboards and distribution equipment.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

H. Repair adjacent construction and finishes damaged during demolition and extension work.

I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

K. Protect salvaged item, as indicated on drawings, against damage during removal, transportation, and reinstallation.

L. Coordinate with Owner for storage location of salvaged items.

M. Return salvaged items of historic value to Owner (markers, plaques, cornerstones, monuments).

3.04 CLEANING AND REPAIR

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

B. Clean existing materials and equipment that remain or that are to be reused.

C. Obtain Owner's guidance before proceeding on any non-scope related repairs needed to existing materials and equipment that remain or that are to be reused.

D. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions.

E. Panelboards: Provide new, typed circuit directory showing revised circuiting arrangement for all panelboards affected by work.

F. Panelboards: Remove abandon cabling inside panelboards.

G. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

I. 120V power connections to fire alarm components.

1.02 RELATED REQUIREMENTS

A. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.

B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes.

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation.

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

J. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

K. NFPA 70 - National Electrical Code.

L. UL 44 - Thermoset-Insulated Wires and Cables.

M. UL 83 - Thermoplastic-Insulated Wires and Cables.

N. UL 267 - Outline of Investigation for Wire-Pulling Compounds.

O. UL 486A-486B - Wire Connectors.

P. UL 486C - Splicing Wire Connectors.

Q. UL 486D - Sealed Wire Connector Systems.

R. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.

S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

T. UL 1569 - Metal-Clad Cables.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated.

C. Nonmetallic-sheathed cable is not permitted.

D. Service entrance cable is not permitted.

E. Armored cable is not permitted.

F. Metal-clad cable is permitted only as follows:

1. At indoor, dry locations.
2. Where not exposed to damage or corrosive atmospheres.
3. Where not exposed to view.
4. Where concealed above accessible ceilings for connections to luminaires.
5. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
6. Provide single conductor building wire in raceway for circuit homerun to panelboards.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductors for Grounding and Bonding: Also comply with Section 260526.

I. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.

J. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

K. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

L. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

M. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
   2. Control Circuits: 16 AWG.

N. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 6 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code (Power and Lighting):
      a. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      b. Equipment Ground, All Systems: Green.
      c. Travelers for 3-Way and 4-Way Switching: Purple or purple electrical tape wrapped around jacket of conductor utilized.

d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
e. For control circuits, comply with manufacturer's recommended color code.

4. Color Code (Systems): The following colors apply to overall outside jacket when conductors are not in color marked conduit. All system wiring not in conduit must be plenum rated.
   a. Fire Alarm System: Red.
   b. Telephone System: White.
   c. HVAC Control System: Green.
   d. PA System: Grey.
   e. Cat5e Data System: Blue.
   f. Cat6 Data System: Violet.
   g. Security System: White.
   h. CCTV System: Yellow

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
   1. Copper Building Wire:
      a. Cerro Wire LLC: www.cerrowire.com/#sle.
      b. Encore Wire Corporation: www.encorewire.com/#sle.
      c. Southwire Company: www.southwire.com/#sle.
      d. Houston Wire and Cable Company: www.houwire.com
      e. General Cable Technologies Corporation: www.generalcable.com
      f. Coleman Cable, Inc: www.colemancable.com
      g. Substitutions: See Section 016000 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Stranded.
   2. Control Circuits: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
   1. Copper Building Wire: Type THHN/THWN, THHN/THWN-2, or XHHW-2.
   2. Any Copper Wire Installed Underground: Type XHHW-2.

2.04 METAL-CLAD CABLE

A. Manufacturers:
   1. Cerro Wire LLC[<>]: www.cerrowire.com.
   2. AFC Cable Systems Inc: www.afcweb.com/#sle.
   3. Encore Wire Corporation: www.encorewire.com/#sle.
   4. Southwire Company: www.southwire.com/#sle.
   5. Coleman Cable, Inc: www.colemancable.com
   6. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Provide dedicated neutral conductor for each single circuit (120V) when utilizing multi-conductor MC cable.

G. Grounding: Full-size integral equipment grounding conductor.

H. Armor: Aluminum or steel interlocked tape.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 260526.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
   3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
   7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Ideal Industries, Inc: www.idealindustries.com/#sle.
      c. NSI Industries LLC: www.nsiindustries.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.

H. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 016000 - Product Requirements.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

1. Manufacturers:
    a. Burndy LLC; _____: www.burndy.com/#sle.
    b. Ilsco: www.ilsco.com/#sle.
    c. Thomas & Betts Corporation: www.tnb.com/#sle.
    d. Substitutions: See Section 016000 - Product Requirements.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
    a. Burndy LLC: www.burndy.com/#sle.
    b. Ilsco: www.ilsco.com/#sle.
    c. Thomas & Betts Corporation: www.tnb.com/#sle.
    d. 3M: www.3m.com.
    e. Substitutions: See Section 016000 - Product Requirements.

2.06 ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
    a. 3M: www.3m.com/#sle.
    b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
    c. Substitutions: See Section 016000 - Product Requirements.
2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Wire Pulling Lubricant:
1. Manufacturers:
    a. 3M: www.3m.com/#sle.
    b. American Polywater Corporation: www.polywater.com/#sle.
    c. Ideal Industries, Inc: www.idealindustries.com/#sle.
    d. Substitutions: See Section 016000 - Product Requirements.
2. Listed and labeled as complying with UL 267.
3. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
4. Suitable for use at installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Arrange circuiting to minimize splices.
   2. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   3. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   4. Common Neutrals: Sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
   5. Provide oversized neutral/grounded conductors where indicated and as specified below.
      a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
      b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
      c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

P. Identify conductors and cables in accordance with Section 260553.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform continuity test on all branch circuit conductors.

C. Verify proper phasing of connections and correct, if necessary.

D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.1234

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

D. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems.

E. NFPA 70 - National Electrical Code.

F. UL 467 - Grounding and Bonding Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
   1. Use insulated copper conductors:
      a. Exceptions:
         1) Use bare tinned copper conductors where installed underground in direct contact with earth.
         2) Use bare tinned copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
      a. Exceptions:
         1) Use exothermic welded connections for connections to metal building frame.
   4. Manufacturers - Mechanical and Compression Connectors:
      a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
      b. Burndy LLC: www.burndy.com/#sle.
      c. Erico International Corporation: www.erico.com
      d. ILSCO: www.ilsco.com
      e. Harger Lightning & Grounding: www.harger.com/#sle.
      f. Thomas & Betts Corporation: www.tnb.com/#sle.
      g. Substitutions: See Section 016000 - Product Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Harger Lightning & Grounding: www.harger.com.
      c. ThermOweld: www.thermoweld.com.
      d. Substitutions: See Section 016000 - Product Requirements.

D. Oxide Inhibiting Compound: Comply with Section 260519.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Install with top of rod 6 inches below finished grade.
   2. Indoor Installations: Install with 4 inches of top of rod exposed.

D. Ground Plate Electrodes: Install ground plate electrodes at a depth of not less than 30 inches.

E. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Identify grounding and bonding system components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Stainless steel rigid metal conduit (RMC).

C. Stainless steel intermediate metal conduit (IMC).

D. PVC-coated galvanized steel rigid metal conduit (RMC).

E. Flexible metal conduit (FMC).

F. Liquidtight flexible metal conduit (LFMC).

G. Galvanized steel electrical metallic tubing (EMT).

H. Stainless steel electrical metallic tubing (EMT).

I. Rigid polyvinyl chloride (PVC) conduit.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC).

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT).

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

F. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit.

G. NFPA 70 - National Electrical Code.

H. UL 1 - Flexible Metal Conduit.

I. UL 6 - Electrical Rigid Metal Conduit-Steel.

J. UL 360 - Liquid-Tight Flexible Metal Conduit.

K. UL 514A - Metallic Outlet Boxes.

L. UL 514B - Conduit, Tubing, and Cable Fittings.

M. UL 797 - Electrical Metallic Tubing-Steel.

N. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel.

O. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

P. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Products: Listed and classified by a Nationally Recognized Testing Laboratory as suitable for the purpose specified and indicated.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Use the conduit types indicated for the specified applications. Where conduit type for a particular application is not specified, consult Architect.

B. Embedded Within Concrete:
1. Within Slab on Grade: Not permitted.
2. Within Slab Above Ground: Not permitted.

C. Hazardous/Classified Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).

D. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).

E. Flexible Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit (FMC).
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
3. Maximum Length: 6 feet unless otherwise indicated.

F. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

H. Corrosive Interior Environments, Exposed (i.e. Pool Room, Pool Access Room): Use PVC conduit.

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.

C. Structured Cabling for Voice and Data Systems: Conduits Only. See Owners low-voltage matrix of responsibility.

D. Provide conduit, fittings, supports, and accessories required for complete raceway system.

E. Provide products listed, classified, and labeled by testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

F. Minimum Conduit Size:
   1. Branch Circuits: 3/4-inch trade size.
   2. Interior: 3/4 inch (21 mm) trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
   2. Nucor Tubular Products: www.nucortubular.com/#sle.
   3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
   4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
   5. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
   4. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.
   5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.

B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
   2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Thomas & Betts Corporation: www.tnb.com.
   2. Robroy Industries: www.robroy.com.
   3. Substitutions: Not permitted.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.

D. Interior Coating: Urethane, minimum thickness of 2 mil, 0.002 inch.

E. PVC-Coated Boxes and Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
   3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
   4. Material: Use steel or malleable iron.
   5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
   6. Interior Coating: Urethane, minimum thickness of 2 mil, 0.002 inch.

F. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.07 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
   1. AFC Cable Systems, Inc: www.afcweb.com.
   2. Electri-Flex Company: www.electriflex.com.
   3. International Metal Hose: www.metalhose.com.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Substitutions: See Section 016000 - Product Requirements.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
   1. AFC Cable Systems, Inc: www.afcweb.com.
   2. Electri-Flex Company: www.electriflex.com.

3. International Metal Hose: www.metalhose.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
a. Do not use die cast zinc fittings.

2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
2. Nucor Tubular Products: www.nucortubular/#sle.
3. Wheatland Tube Company: www.wheatland.com.
4. Substitutions: See Section 016000 - Product Requirements.

B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Substitutions: See Section 016000 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use compression/gland or set-screw type.
a. Do not use indenter type connectors and couplings.

2.10 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Connectors and Couplings: Use compression/gland or set-screw type.

2.11 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.

C. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

D. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.

E. Sealing Systems for Concrete Penetrations:

1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify routing and termination locations of conduit prior to rough-in.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.

E. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated without specific routing, determine exact routing required.
3. Conceal conduits unless specifically indicated to be exposed.
4. Conduits in the following areas may be exposed, unless otherwise indicated:
   a. Electrical rooms.
   b. Mechanical equipment rooms.
   c. Within joists in areas with no ceiling.
5. Unless otherwise approved, do not route exposed conduits:
   a. Across floors.
   b. Across top of parapet walls.
   c. Across building exterior surfaces.
6. Arrange conduit to maintain adequate headroom, clearances, and access.
7. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
8. Arrange conduit to provide no more than 150 feet between pull points.
9. Route conduits above water and drain piping where possible.
10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
13. Group parallel conduits in same area on common rack.

F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

4. Use conduit strap to support single surface-mounted conduit.
    a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
9. Use of spring steel conduit clips for support of conduits is not permitted.
10. Use of wire for support of conduits is not permitted.
11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
8. Secure joints and connections to provide mechanical strength and electrical continuity.

H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces.
3. Provide sleeves for penetrations as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
6. Where conduits penetrate waterproof membrane, seal to maintain integrity of membrane.
7. Provide decorative metal escutcheon plates for conduit penetrations exposed to public view.
8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.

I. [Blank]:

J. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
   3. Where conduits are subject to earth movement by settlement or frost.

K. Conduit Sealing:
   1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
      a. Where conduits enter building from outside.
      b. Where service conduits enter building from underground distribution system.
      c. Where conduits enter building from underground.
      d. Where conduits may transport moisture to contact live parts.
   2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
      a. Where conduits pass from outdoors into conditioned interior spaces.
      b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

L. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

M. Provide grounding and bonding; see Section 260526.

N. Identify conduits; see Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

C. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

G. NFPA 70 - National Electrical Code.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.

J. UL 508A - Industrial Control Panels.

K. UL 514A - Metallic Outlet Boxes.

L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

M. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.

4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for boxes for hazardous (classified) locations, floor boxes, underground boxes/enclosures, and boxes/cabinets/enclosures over 100 cubic inches.
   1. Outlet and device box submittals are not required.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Comply with NEMA 250 for electrical cabinets and enclosures larger than 100 cubic inches (1,650 cu cm).

C. Products: Listed and classified by a Nationally Recognized Testing Laboratory as suitable for the purpose specified and indicated.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes for damp or wet locations; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes where exposed galvanized steel rigid metal conduit is used.
   4. Use suitable concrete type boxes where flush-mounted in concrete.
   5. Use suitable masonry type boxes where flush-mounted in masonry walls.

6. Use raised covers suitable for the type of wall construction and device configuration where required.
7. Use shallow boxes where required by the type of wall construction.
8. Do not use "through-wall" boxes designed for access from both sides of wall.
9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
13. Wall Plates: Comply with Section 262726.
14. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
    c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
    d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    e. Thomas & Betts Corporation: www.tnb.com/#sle.
    f. Substitutions: See Section 016000 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
    c. Wet, Damp, or Corrosive Locations: Type 4X, stainless steel or fiberglass.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
    c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
    c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.
    d. Substitutions: See Section 016000 - Product Requirements.

CI. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
1. Manufacturers:
    a. Appleton, a brand of Emerson Electric Co: www.emerson.com/#sle.
    b. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    c. Hubbell Incorporated; Killark Products: www.hubbell-killark.com/#sle.

d. Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas.

G. Boxes may be surface-mounted where exposed conduits are permitted.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100.
   2. Unless dimensioned, box locations indicated are approximate.
      a. Owner must approve any adjustment to box locations for wall devices.
   3. Locate boxes for devices installed under other sections:
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
      b. Communications Systems Outlets: Comply with Section 271000.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.

10. Locate junction and pull boxes to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.
11. Locate junction and pull boxes in the following areas:
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

L. Floor-Mounted Cabinets: Mount on properly sized 4 inch high concrete pad constructed in accordance with Section 033000.

M. Install boxes as required to preserve insulation integrity.

N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

O. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

P. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

R. Close unused box openings.

S. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

T. Provide grounding and bonding in accordance with Section 260526.

U. Identify boxes in accordance with Section 260553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 260583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 260533.13 - Conduit for Electrical Systems.

C. Section 260533.16 - Boxes for Electrical Systems.

D. Section 262726 - Wiring Devices.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Disconnect Switches: As specified in individual equipment sections.

B. Wiring Devices: As specified in Section 262726.

C. Flexible Conduit: As specified in Section 260533.13.

D. Wire and Cable: As specified in Section 260519.

E. Boxes: As specified in Section 260533.16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.
B. Wall dimmers.
C. Receptacles.
D. Wall plates.
E. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.
C. Section 260583 - Wiring Connections: Cords and plugs for equipment.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.
B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.
C. NEMA WD 1 - General Color Requirements for Wiring Devices.
D. NEMA WD 6 - Wiring Devices - Dimensional Specifications.
E. NFPA 70 - National Electrical Code.
F. UL 20 - General-Use Snap Switches.
G. UL 498 - Attachment Plugs and Receptacles.
H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices.
I. UL 943 - Ground-Fault Circuit-Interrupters.
J. UL 1449 - Standard for Surge Protective Devices.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. No submittals required.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices Installed in Finished Spaces: Ivory withivory nylon wall plate.

C. Wiring Devices Installed in Unfinished Spaces: Ivory withivory nylon wall plate.

D. Wiring Devices Installed in Wet or Damp Locations: Ivory with specified weatherproof cover.

E. Wiring Devices Installed in Rough Service Locations (Laboratories Workshops Gymnasiums Kitchens): Ivory with stainless steel wall plate.

F. Wiring Devices Connected to Emergency Power: Red with red nylon wall plate.

G. Wiring Devices Connected to TVSS Power Panels: Grey with grey nylon wall plate.

2.02 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.03 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. Convenience Receptacles:
   1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

C. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
    a. Provide test and reset buttons of same color as device.
2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

2.04 WALL PLATES

A. Wall Plates: Comply with UL 514D.
    1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
    2. Size: Standard.
    3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

D. Weatherproof Covers for Wetor Damp Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.05 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
    1. Hubbell Incorporated: www.hubbell.com/#sle.
    2. Thomas & Betts Corporation: www.tnb.com/#sle.
    3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.
    4. Substitutions: See Section 016000 - Product Requirements.

B. Description: Service fittings compatible with floor boxes provided under Section 260533.16 with components, adapters, and trims required for complete installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
    1. Mounting Heights: As indicated on the drawings.
    2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.

3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
4. Locate wall switches on strike side of door with edge of wall plate 4 inches from edge of door frame. Where 4 inches is not possible due, notify Architect to obtain direction prior to proceeding with work.
5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

J. Install wiring devices plumb and level with mounting yoke held rigidly in place.

K. Install wall switches with OFF position down.

L. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

O. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION