SET NO. _____

Forest Hill Elementary School
HVAC Upgrade
AFJMc #25-171

CPSB # 2027-752

CADDO PARISH SCHOOL BOARD
1961 Midway Street
Shreveport, LA 71108-2201

December 31, 2025

Aillet, Fenner, Jolly & McClelland, Inc.
3003 Knight Street, Suite 120
Shreveport, LA 71105
Phone 318-425-7492

PROJECT MANUAL

CADDO PARISH SCHOOL BOARD
FOREST HILL ELEMENTARY SCHOOL
HVAC UPGRADE
2005 FRANCAIS DRIVE
SHREVEPORT, LOUISIANA 71118

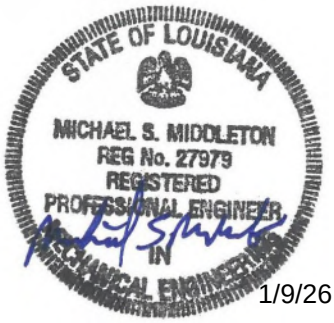
PROJECT NO. 2027-752

AFJMC #25-171

SEALS

Specification Divisions/Sections prepared under my responsible supervision:

DIVISION 00	**BIDDING AND CONTRACT DOCUMENTS**
DIVISION 01	**GENERAL REQUIREMENTS**
DIVISION 02	**SITE CONSTRUCTION**
DIVISION 05	**METALS**
DIVISION 07	**THERMAL AND MOISTURE PROTECTION**
DIVISION 09	**FINISHES**
DIVISION 15	**MECHANICAL**
DIVISION 16	**ELECTRICAL**



1/9/26

MICHAEL S. MIDDLETON, P.E.
MECHANICAL ENGINEER– LA LICENSE 27979

Division 00
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Specification Book

ADVERTISEMENT FOR BIDS

SEALED BIDS will be received by the Caddo Parish School Board, 1961 Midway Street, Shreveport, Louisiana, in the Construction and Capital Projects Department Building and electronically at Bidexpress.com, until 3:30 P.M., Tuesday February 10, 2026.

for Caddo Parish School Board – Forest Hill Elementary School HVAC Upgrade;
Project No. 2027-752.

Complete Bidding Documents may be obtained from Aillet, Fenner, Jolly & McClelland, Inc., 3003 Knight Street, Suite 120, Shreveport, LA 71105 upon receipt of $100.00 for each set of documents. Deposit is fully refundable to all bonafide prime bidders who submit a bid upon return of the documents, in good condition no later than ten (10) days after receipt of bids. Bidding documents will be available in the office of the Designer on or about Thursday January 15, 2026. NOTE: LOUISIANA LICENSED CONTRACTOR REQUIRED FOR THIS PROJECT WITH A MAJOR CLASSIFICATION AS AN MECHANCIAL CONTRACTOR.

BID SECURITY equal to five percent (5%) of the Total Bid shall be in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A must be attached to and made a part of the bid. If a bid bond is provided it shall be on the provided form and only on the provided form. Bid bonds must be written by a qualified company licensed to do business in Louisiana.

The successful bidder will be required to furnish a Performance Bond written by a company licensed to do business in Louisiana in an amount equal to one hundred percent (100%) of the contract amount.

For this project, Liquidated Damages will apply in the amount of One Thousand ($1,000.00) per day for each consecutive calendar day which the work is not completed, beginning with the first day beyond the established completion date of July 31, 2026.

No bid may be withdrawn for a period of forty-five (45) days after actual date of the opening thereof.

The Board reserves the right to reject any and all bids.

The Caddo Parish School Board desires that Bidders make a good faith effort to utilize 25% small and economically disadvantaged businesses.

A MANDATORY PRE-BID CONFERENCE will be held on **Monday February 2, 2026, at 1:00 P.M.** Contractors must report to Forest Hill Elementary School (2005 Francais Drive, Shreveport, LA 71118) where they will be directed to the meeting location. Sign-in will be at the meeting location between 12:45 P.M. and 1:00 P.M. Meeting will be closed at 1:00 P.M. Persons arriving after the meeting starts will not be allowed to submit a prime bid for the project. Attendance at the pre-bid conference by an officer, estimator or other individual knowledgeable with preparing the bid, is **MANDATORY** and will be considered a pre-condition for bidder eligibility.

Budget: $1,000,000.00

CADDO PARISH SCHOOL BOARD
An Equal Opportunity Employer

Keith Burton, Superintendent

Shreveport Times Publication Dates:
January 15, 2026; January 22, 2026; & January 29, 2026.
Caddo Parish School Board
Capital Projects Fund
Account No. CC 1135
Copy to: Accounts Payable

CADDO PARISH SCHOOL BOARD
FOREST HILL ELEMENTARY SCHOOL
HVAC UPGRADE
2005 FRANCAIS DRIVE
SHREVEPORT, LOUISIANA 71118

PROJECT NO. 2027-752

AFJMC #25-171

INDEX TO DRAWINGS

INSTRUCTION TO BIDDERS

ARTICLE I
DEFINITIONS

1.1 The Contract Documents include the following:

Advertisement for Bids
Instructions to Bidders
Bid Form
Bid Security
Performance Bond
Affidavit
General Conditions of the Contract for Construction, AIA Document 201, 2007 Edition
Supplementary Conditions
Standard Form of Agreement Between Owner and Contractor, AIA Document A101
Specifications, Divisions 01 through 16 dated December 31, 2025.
Drawings, Sheets Nos. T1 through M2.3 of 10 sheets. Addenda issued
during the bid period and acknowledged in the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

1.3 Addenda are written or graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the bidding documents by additions, deletions, clarifications, corrections and prior approvals.

1.4 A Bid is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein supported by data called for by the Bidding Documents.

1.5 Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described as the Base, to which Work may be added for sums stated in Alternate Bids.

1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added or deducted to the amount of the Base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

1.7 The actual bid amount will be determined by the addition of the base bid and all accepted alternates.

1.8 A Unit Price is the amount stated in a project bid representing the price per unit of materials and/or services as described in the Contract Documents.

1.9 A Bidder is one who submits a Bid for a prime contract with the Owner for the Work described in the proposed Contract Documents.

1.10 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the Work.

1.11 Where the word "Architect" is used in any of the Documents, it shall refer to the Prime Designer of the project, an Architect, Engineer or Landscape Architect.

ARTICLE 2
BIDDER'S REPRESENTATION

2.1 Each Bidder by making his bid represents that:

2.1.1 He has read and understands the Bidding Documents and his Bid is made in accordance therewith.

2.1.2 He has visited the site and has familiarized himself with the local conditions under which the Work is to be performed.

2.1.3 His Bid is based upon the materials, systems and equipment described in the Bidding Documents as advertised and as modified by Addenda.

2.2 The Bidder must be fully qualified under any state or local licensing law for contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, Revised Statutes 37:2150, et seq. will be considered, if applicable. The Contractor shall be responsible for determining that all of his Sub-bidders or prospective Subcontractors are duly licensed in accordance with law.

ARTICLE 3
BIDDING DOCUMENTS

3.1 Copies

3.1.1 Bidding Documents may be obtained from the Architect for a deposit as stated in the Advertisement for Bids. The deposit will be refunded as stated in the Advertisement for Bids. No deposits will be refunded on Bidding Documents returned later than ten days after receipt of bids.

3.1.2 Complete sets of Bidding Documents shall be used in preparing bids; neither the Owner nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.1.3 The Owner or Architect in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining bids on the Work and do not confer a license or grant for any other use.

3.2 Interpretation or correction of Bidding Documents

3.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents or of the site and local conditions.

3.2.2 Bidders requiring clarifications or interpretation of the Bidding documents shall make a written request to the Architect, at least ten days prior to the date for receipt of bids.

3.2.3 Any interpretation, correction or change of the Bidding Documents will be made by Addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and bidders shall not rely upon such interpretations, corrections and changes.

3.3 Substitutions

3.3.1 The materials, products and equipment described in the Bid Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitutions shall be allowed after bids are received.

3.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least fourteen (14) working days prior to the opening of bids. (La. R.S. 38:2295(C)) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. It shall be the

responsibility of the proposer to include in his proposal all changes required of the Bid Documents if the proposed product is used. Prior approval, if given, is contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

3.3.3 If the Architect approves any proposed substitution, such approval shall be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

3.4 Addenda

3.4.1 Addenda shall be transmitted to all who are known by the Architect to have received a complete set of Bidding Documents.

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

3.4.3 Addenda shall not be issued within a period of three calendar days prior to the advertised time for the opening bids, excluding Saturdays, Sundays, and any other legal holidays. If it is necessary to issue an addendum within the three calendar days prior to receipt of bids, the opening of such bids shall be extended exactly one week, without the requirement of readvertising. The Owner shall be consulted prior to issuance of such an addendum, and shall approve such issuance.

3.4.4 **Each Bidder shall ascertain from the Architect prior to submitting his bid that he has received all Addenda issued, and he shall acknowledge their receipt on the Bid Form.**

ARTICLE 4
BIDDING PROCEDURE

4.1 Form and Style of Bids

4.1.1 Bids **shall** be submitted on the "**Louisiana Uniform Public Work Bid Form"** provided by the Architect.

4.1.2 All blanks on the bid form shall be filled in by typewriter, manually in ink or electronically. Fill out all addenda that apply and place **N/A** in all remaining blanks.

4.1.3 Any interlineation, alteration or erasure must be initialed by the signer of the Bid Form or his authorized representative.

4.1.4 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.

4.1.5 The Bid Form which identifies the legal name of Bidder and statement whether Bidder is a sole proprietor, a partnership, a corporation, or any other legal entity, and gives the amount of the bid and any alternates. A bid submitted by an agency shall have a current Power of Attorney attached certifying agent's authority to bind Bidder.

4.1.6 Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.

4.1.6 The Bid Form shall be signed by a person or persons legally authorized to bind the bidder to a contract. A bid which is not signed in the designated place will be considered non-responsive and not read aloud.

4.1.8 Bidders are cautioned to complete all alternates and unit prices should such be required in the Bid Form. Failure to submit alternates and unit prices will render the Bid non-responsive and shall cause its rejection.

4.1.9 All Addenda must be acknowledged on the Bid Form or the bid will be considered non-responsive. Fill out all addenda that apply and place **N/A** in all remaining blanks.

4.2 Bid Security

4.2.1 No bid shall be considered or accepted unless the bid is accompanied by bid security in an amount of not less than five percent (5%) of the Base Bid and all additive/deductive alternatives. The bid security shall be in the form of a certified check or cashier's check drawn on a bank insured by the Federal Deposit Insurance Corporation, or a bid bond written by a surety company licensed to do business in Louisiana, countersigned by a person who is under contract with the surety company or bond issuer as a licensed agent in this state and who is residing in this state and accompanied by appropriate power of attorney and in favor of the Caddo Parish School Board, in accordance with LRS 38:2218.

Bid security furnished by the Contractor shall guarantee that the Contractor will, if awarded the work according to the terms of his proposal, enter into the Contract and furnish Performance Bonds as required by these Contract Documents, within fifteen (15) days after written notice of contract award.

Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, and/or forfeiture of the Bidder's right to transact business with the School Board for a period of one year following the date the penalty is invoked.

4.2.2 The Owner will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or all Bids have been rejected.

4.3 Submission of Bids

4.3.1 Bids shall be sealed in an opaque envelope with the notation **‘ Bid Enclosed”** on the face thereof.
Bids will be received until the time specified and at the place specified in the Advertisement for Bids. It shall be the specific responsibility of the Bidder to deliver his sealed bid to the Caddo Parish School Board at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason, including late delivery by United States Mail, or express delivery, shall disqualify the bid. **The bid envelope shall be identified on the outside with the name of the project, project number, and the name, address, and license number of the Bidder**. Attachments, if required (Unit Price Schedules for example) must be included as an attachment to the bid form.

If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed” on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to: Caddo Parish School Board, Attn.: Construction & Capital Projects Department, 1961 Midway, Shreveport, LA 71108. Bids sent by express delivery shall be delivered to Caddo Parish School Board, Construction & Capital Projects Department, 1961 Midway, Shreveport, LA 71108. Starting with bids received in 2011, Bidders will have the option to submit their bid electronically at BidExpress.com. Solicitation documents (Bid Advertisement, Bid Form, Unit Price Form and Bid Bond Form) will be posted on BidExpress.com. The bidder will be responsible for all charges and fees payable to Bid Express for the submission of their electronic Bid.

4.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in the Advertisement for Bids, or any extension thereof made by Addendum. Bids received after the time and date for receipt of bids will be returned unopened.

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

4.3.4 Oral, telephonic or telegraphic Bids are invalid and will not receive consideration. Owner will not consider notations written on outside of Bid Envelope which have the effect of amending the Bid.

4.4 Written Evidence of Authority of Person Signing the Bid – Mandatory for all Bidders

4.4.1 The Bid shall include the legal name of the bidder, and shall be signed by the person legally authorized to submit the bid on behalf of the legal entity or sole proprietor. The Bid shall include the title of the person signing the bid, for example president of a corporation, member of a limited liability company or sole proprietor if an individual.

4.4.2 Notwithstanding the language contained in the Uniform Public Works Bid Form, in compliance with La. R.S. 2212 A (5) as amended in 2014, all bidders shall submit at the time of bidding written evidence of authority of the person signing the bid. The written evidence of authority shall be submitted with the bid in the sealed bid envelope. Failure to submit written evidence of authority of the person signing the bid will result in the bid being declared nonresponsive.

4.4.3 The authority of the signature of the person submitting the bid shall be deemed sufficient and acceptable if any of the following conditions are met and such written evidence is submitted with the bid:

a. The signature on the bid is that of any corporate officer listed on the most current annual report on file with the Louisiana secretary of state, or
b. The signature on the bid is that of any member of a partnership, limited liability company, limited liability partnership, or other legal entity listed in the most current business records on file with the secretary of state, or
c. The signature on the bid is that of an authorized representative as documented by the legal entity certifying the authority of the person signing the bid to submit a bid on behalf of the legal entity, or
d. The legal entity has filed in the appropriate records of the Louisiana secretary of state, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. Any such document on filed with the secretary of state shall remain in effect and shall be binding upon the principal until specifically rescinded and canceled from the records of the office of the secretary of state.

4.5 Modification or Withdrawal of Bid

4.5.1 A bid shall not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his Bid, except in accordance with La. R.S. 38: 2214 which states, in part, "Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the bid, may be withdrawn by the contractor if clear and convincing sworn, written evidence of such errors is furnished to the public entity within forty- eight hours of the bid opening excluding Saturdays, Sundays, and legal holidays".

4.5.2 Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.

4.5.3 Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

ARTICLE 5
CONSIDERATION OF BIDS

5.1 Opening of Bids

5.1.1 The properly identified Bids received on time with the Contractors License noted will be opened publicly and will be read aloud, and a tabulation abstract of the amounts of the base bids and alternates, if any, will be made available to Bidders.

5.2 Rejection of Bids

5.2.1 The Owner shall have the right to reject any or all Bids and in particular to reject a Bid not accompanied by any required bid security or data required by the Bidding Documents or a Bid in any way incomplete or irregular, as referenced in Section 4.1.1.

5.3 Acceptance of Bid

5.3.1 It is the intent of the Owner, if he accepts any Alternates, to accept them in the order in which they are listed in the bid form. Determination of the low Bidder shall be on the basis of the sum of the Base Bid and the Alternates accepted. However, the Owner shall reserve the right to accept alternates in any order which does not affect determination of the low Bidder. Unit prices shall not be used to determine the low Bidder.

5.3.2 It is the intent of the Owner to award a contract to the lowest responsible Bidder in accordance with the requirements of the Bidding Documents, and if the bid does not exceed the funds available.

ARTICLE 6
POST-BID INFORMATION

6.1 Submissions

6.1.1 OPPORTUNITY CADDO FAIR SHARE: The following information is submitted.

6.1.1.1 Are any subcontractors required for this project?_____

6.1.1.2. If “yes”, the lowest responsible and responsive Bidder shall complete and submit Opportunity Caddo Fair Share Forms 1A, (1B if applicable) and 2 within forty-eight (48) hours of notification. Opportunity Caddo Fair Share Form 3 is to be submitted monthly during the course of work.

6.1.2 At the pre-construction conference, the Contractor shall submit the following information to the Architect.

6.1.2.1 A breakdown of the contract cost into the 16 Divisions of the C.S.I. No payments will be made to the Contractor until this is received. The proprietary names and the suppliers of the principal items or systems of material and equipment proposed or the Work.

6.1.2.2 A list of names of all Subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

6.1.3 The Contractor will be required to establish to the satisfaction of the Architect and the Owner the reliability and responsibility of the proposed Subcontractors to furnish and perform the Work described in the Sections of the Specifications pertaining to such proposed Subcontractor's respective trades.

6.1.4 The Architect will notify the Contractor if either the Owner or the Architect, after due investigation, has reasonable and substantial objection to any person or organization on the Contractor's list of proposed Subcontractors. If there are objections, the Contractor shall submit alternative subcontractor(s) for their approval and shall indicate the effect, if any, the selection of an alternative Subcontractor may have on the Bid submitted.

6.1.4 Subcontractors and other persons and organizations proposed by the Bidder and accepted by the Owner and the Architect must be used on the Work for which they were proposed and accepted and shall not be changed except with the written approval of the Owner and the Architect.

ARTICLE 7
PERFORMANCE BOND

7.1 Bond Required

7.1.1 The Contractor shall furnish and pay for a performance and payment bond written by a company licensed to do business in Louisiana, in accordance with the current L.R.S. 38:2219. The bond shall be written in an amount equal to 100% of the contract amount.

7.2 Time of Delivery and Form of Bond

7.2.1 The Bidder shall deliver the required bond to the Owner simultaneous with the execution of the Contract.

7.2.2 Bond shall be in the form furnished by the Owner, entitled PERFORMANCE BOND, as copy of which is included in the Contract Documents.

7.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

ARTICLE 8
FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

8.1 Form to be used.

8.1.1 Form of the Contract to be used shall be Standard Form of Agreement Between Owner and Contractor, AIA Document A101, and General Conditions of the Contract for Construction, AIA Document A201, as revised by Supplemental Conditions.

8.2 Award

8.2.1 In accordance with Louisiana Law, if the Contract is awarded to the Bidder, he shall at the time of the signing of the contract execute the Non-Collusion Affidavit included in the Contract Documents.

8.2.2 Before award of the contract, the successful bidder shall furnish to the Owner a certified copy of the minutes of the corporation or partnership meeting which authorized the party executing the bid to sign on behalf of the Contractor.

In accordance with La. R.S. 38:2227 [references La R.S. 38:2212(A)(3)(c)(ii), which has since been renumbered as La R.S. 38:2212(B)(3)], La. R.S. 38:2212.10 and La. R.S. 23:1726(B) the apparent low bidder on this project shall submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package to Construction & Capital Projects Department within 10 days after the opening of bids**.**

ARTICLE 9
COMPLETION TIME AND LIQUIDATED DAMAGES

9.1 The completion of the Contract must be within the time stated on the Contract, subject to such extensions as may be granted under paragraph 4.3.8, "Claims for Additional Time" in the General Conditions and the Supplementary Conditions, or the Contractor **shall receive no further monthly progress payments until the project is substantially completed.**

9.2 Liquidated damages may be required by Owner for a contract not completed within the time stated in Article 9.1. Liquidated Damages charges will be calculated at the ration of 1/10th of 1 percent of the contract amount per day, with a $200 minimum and a $1000 maximum.

ARTICLE 10
MINIMUM WAGES

N/A

ARTICLE 11
PRE-BID CONFERENCE

11.1 A pre-bid conference shall be held at the project site at least 10 days before the date for receipt for bids. The Architect shall coordinate the setting of the date, time and place for the pre-bid conference with the Owner and shall invite in writing the Owner, and all who have received sets of the Bidding Documents to attend. The purpose of the pre-bid conference is to familiarize Bidders with the requirements of the Project and the intent of the Contract Documents, and to receive comments and information from interested Bidders. If the Pre-Bid Conference is stated in the Advertisement for Bids to be a Mandatory Pre-Bid Conference, bids shall be accepted only from those bidders who attend the Pre-Bid Conference. Contractors who are not in attendance for the **entire** Pre-Bid Conference will be considered to have not attended.

11.2 Any revision of the Bidding Documents made as a result of the pre-bid conference shall not be valid unless included in an Addendum issued in accordance with Paragraph 3.4 of the Instructions to Bidders.

ARTICLE 12
CONTRACTOR POLICY

12.1 The Caddo Parish School Board desires that Bidders make a good faith effort to employ small and economically disadvantaged businesses. (Policy FEF, Construction Contracts Bidding and Awards)

The Bidder shall demonstrate making a good faith effort to reach the aspirational goal of 25% utilization of Opportunity Caddo Certified businesses listed in the Directory of Small and Economically Disadvantaged Businesses. The lowest responsible and responsive Bidder shall complete and submit Opportunity Caddo Fair Share Forms 1A, (1B if applicable) and 2 within forty-eight (48) hours of notification. Opportunity Caddo Fair Share Form 3 is to be submitted monthly during the course of work. All Bidders shall solicit a minimum of five (5) businesses listed as being "OCC" (Opportunity Caddo Certified) in the Directory of Small and Economically Disadvantaged Businesses for each category or area of work for which the Bidder intends to engage subcontractors. If there are less than five (5) such businesses, then all businesses listed as OCC in that category shall be solicited. If the Bidder solicited any non-OCC businesses listed in the Directory, then form 1B should be submitted along with form 1A. Bidders are urged to consider others listed in the Directory of Small and Economically Disadvantaged Businesses and to reflect such solicitation on Form 1B.

Even though the Caddo Parish School Board encourages the use by Bidders of businesses listed in the Directory of Small and Economically Disadvantaged Businesses, Bidders are not required to retain or use any such subcontractors or businesses in performing the work which is the subject of the bid.

12.3. The successful bidder shall, at the pre-construction conference or, prior to contract execution if there is no pre-construction conference, provide the Owner with a written list of all subcontractors engaged by specialty, with the amount of subcontract specified and the identification of any minority firms.

12.4 A listing of the Opportunity Caddo Directory of Small and Disadvantaged Business begin on the next page. Bidders are also referred to the City of Shreveport Directory of Certified Disadvantaged Business Enterprises, for additional Female, African American, Hispanic American, Native American, Asian-Pacific American, Asian-Indian American, and other Disadvantaged Business Enterprises.

OPPORTUNITY CADDO

DIRECTORY OF

SMALL & ECONOMICALLY DISADVANTAGED BUSINESSES

CADDO PARISH PUBLIC SCHOOLS

Fair Share Administration
1961 Midway Avenue
Shreveport, LA 71108
318-603-6560

Current list is available on CPSB website www.caddoschools.org;
"Purchasing Dept."

CADDO PARISH SCHOOL BOARD

INSTRUCTIONS FOR PREPARING LOUISIANA UNIFORM PUBLIC WORK BID FORM

BID FORM defines requirements of items to be purchased or work to be done and must be completed and submitted as a part of this bid. Bidder's name must appear on the Bid Form. Spaces are provided for this purpose.

1. ITEM SPECIFICATION. Specifying of a certain brand, make or manufacturer is to denote the quality, type and standard of the article desired. Articles offered must be new merchandise (unless specifically excepted) and must be of equal or superior grade.

   A. It is recognized there may be other brands that could likely serve the needs of the school system. However, it should be understood by the bidder that the use of brand names and numbers is to establish standards and styles of products that have been judged to meet the need. Such use of brand names is in no way designed or intended to restrict the bidding, but contrarily, to invite bids of comparable products that would equally satisfy the requirements stated herein. Equivalent brands that meet the approval of the Caddo Parish School Board will be accepted.

   B. The contractor shall not be permitted to deviate from the specifications unless written questions or requests are submitted a minimum of seven (7) working days prior to bid opening. Such requests shall state the reason for such change and provide documented justification that such change is of equal material and execution. Approval/disapproval of specification changes requests will normally be acted upon within 48 hours of receipt, but not later than three minimum working days prior to bid opening date. If approved, an addendum shall be issued to all prospective bidders.

2. PRICES. The Bidder shall quote a net unit price where required for each item with a lump sum extended total for the quantity required. See BID FORM for specific price quotation form; prices must be on the unit(s) designated.

   A. FREIGHT. All prices bid shall include platform delivery F.O.B. Shreveport, Louisiana. All cartage, drayage, packing, etc., shall be delivered to and unloaded at the receiving station designated in the SPECIAL CONDITIONS or the BID PROPOSAL FORM. All shipments must be received and accepted by a designated agent of the school board.

   B. DISCOUNTS. Discounts for prompt payment as may be offered on the bid or on the invoice will be accepted, but these discounts will not be considered in evaluating bids for purposes of determining a low bidder unless all other factors are equal.

3. OBJECTIONS. Objections to the specifications and/or bid conditions must be filed in writing and must be received by the Construction and Capital Projects Department at least five (5) days prior to the date specified for acceptance of the bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: CADDO PARISH SCHOOL BOARD
P. O. BOX 32000 (71130-2000)
1961 MIDWAY STREET
SHREVEPORT, LA 71108
(Owner to provide name and address of owner)

BID FOR: Forest Hill Elem School HVAC Upgrade
Project Number: 2027-752
Completion Date: July 31, 2026
Liquidated Damages: $1,000.00 per day
(*Owner to provide name of project and other identifying information)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Aillet, Fenner, Jolly & McClelland, Inc. and dated: December 31, 2025.
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1: Provide all work associated with replacing rooftop unit RTU-K1.

_____ Dollars ($_____)

Alternate No. 2 N/A:

N/A _____ Dollars ($N/A _____)

Alternate No. 3 N/A:

N/A _____ Dollars ($N/A _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

Suggested language for Instructions to Bidders; re: Written evidence of authorization to sign bid

Instructions to Bidders: Written Evidence of Authority of Person Signing the Bid – Mandatory for all Bidders

1. The Bid shall include the legal name of the bidder, and shall be signed by the person legally authorized to submit the bid on behalf of the legal entity or sole proprietor. The Bid shall include the title of the person signing the bid, for example president of a corporation, member of a limited liability company or sole proprietor if an individual.

2. *Notwithstanding the language contained in the Uniform Public Works Bid Form*, in compliance with La. R.S. 2212 A (5) as amended in 2014, all bidders shall submit at the time of bidding written evidence of authority of the person signing the bid. The written evidence of authority shall be submitted with the bid in the sealed bid envelope. *Failure to submit written evidence of authority of the person signing the bid will result in the bid being declared nonresponsive.*

3. The authority of the signature of the person submitting the bid shall be deemed sufficient and acceptable if any of the following conditions are met and such written evidence is submitted with the bid:

    a. The signature on the bid is that of any corporate officer listed on the most current annual report on file with the Louisiana secretary of state, or
    b. The signature on the bid is that of any member of a partnership, limited liability company, limited liability partnership, or other legal entity listed in the most current business records on file with the secretary of state, or
    c. The signature on the bid is that of an authorized representative as documented by the legal entity certifying the authority of the person signing the bid to submit a bid on behalf of the legal entity, or

d. The legal entity has filed in the appropriate records of the Louisiana secretary of state, an affidavit, resolution or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts. Any such document on filed with the secretary of state shall remain in effect and shall be binding upon the principal until specifically rescinded and canceled from the records of the office of the secretary of state.

Tom Schedler
Secretary of State

LIMITED LIABILITY COMPANY
ANNUAL REPORT
For Period Ending [redacted]

[redacted]
2014

Mailing Address Only (INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)

[redacted]

1

(INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
Registered Office Address in Louisiana (Do not use P. O. Box)

[redacted]

Federal Tax ID Number

Our records indicate the following registered agents for the company. Indicate any changes or deletions below. All agents must have a Louisiana address. Do not use a P. O. Box. A NEW REGISTERED AGENT REQUIRES A NOTARIZED SIGNATURE.

[redacted]

I hereby accept the appointment of registered agent(s).

New Registered Agent Signature

Sworn to and subscribed before me on
NOTARY NAME MUST BE TYPED OR PRINTED WITH NOTARY #

Notary Signature Date

This report reflects a maximum of three members/managers for the company. Indicate any changes or deletions below. Include a listing of all names and addresses. Do not use a P. O. Box. If additional space is needed attach an addendum. Officer titles, such as president or secretary are not acceptable.

[redacted] Manager

The filing of a false public record, with the knowledge of its falsity, is a crime, subjecting the filer to the fine or imprisonment or both under R.S. 14:133.

SIGN →	To be signed by a manager, member, or agent	Title	Phone	Date
	Signee's address	Email Address		(For Office Use Only)

Enclose filing fee of $30.00

Return by: [redacted]

Make remittance payable to Secretary of State
Do Not Send Cash
Do Not Staple

To: Commercial Division
P. O. Box 94125
Baton Rouge, LA 70804-9125
Phone (225) 925-4704

web site: www.sos.louisiana.gov

DO NOT STAPLE

1

UNSIGNED REPORTS WILL BE RETURNED

Tom Schedler
Secretary of State

DOMESTIC CORPORATION

ANNUAL REPORT

For Period Ending
[redacted]

[redacted]
2014

Mailing Address Only (INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
[redacted]

(INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
Registered Office Address in Louisiana (Do not use P. O. Box)
[redacted]

Issued Shares:	Federal Tax ID Number

Our records indicate the following registered agents for the corporation. Indicate any changes or deletions below. All agents must have a Louisiana address. Do not use a P. O. Box.
A NEW REGISTERED AGENT REQUIRES A NOTARIZED SIGNATURE.
[redacted]

I hereby accept the appointment of registered agent(s).

New Registered Agent Signature

Sworn to and subscribed before me on
NOTARY NAME MUST BE TYPED OR PRINTED WITH NOTARY #

Notary Signature **Date**

This report reflects a maximum of three officers or directors from our records for this corporation. Indicate any changes or deletions below. Include a listing of all names along with each title held and their address. Do not use a P. O. Box. If additional space is needed attach an addendum.

[redacted]
President, Secretary, Director

Vice-President, Director

Our records indicate the following addresses for the corporation. Indicate any changes below.

Principal business establishment in Louisiana (Do not use a P. O. Box)

The filing of a false public record, with the knowledge of its falsity, is a crime, subjecting the filer to the fine or imprisonment or both under R.S. 14:133.

SIGN →	To be signed by an officer, director or agent	Title	Phone	Date
	Signee's address	Email Address		(For Office Use Only)

Enclose filing fee of $30.00

Return by: [redacted]

Make remittance payable to Secretary of State
Do Not Send Cash
Do Not Staple

web site: www.sos.louisiana.gov

DO NOT STAPLE

To: **Commercial Division**
P. O. Box 94125
Baton Rouge, LA 70804-9125
Phone (225) 925-4704

2

UNSIGNED REPORTS WILL BE RETURNED

Tom Schedler
Secretary of State

DOMESTIC PARTNERSHIP ANNUAL REPORT

For Period Ending [redacted]

2014

Mailing Address Only (INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)

[redacted]

1

(INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
Principal Place of Business in Louisiana (Do not use P. O. Box)

[redacted]

Federal Tax ID Number

This report reflects a maximum of three partners from our records for the partnership. Indicate any changes or deletions below. Include a listing of all partners and their municipal address. Do not use a P. O. Box. If additional space is needed attach an addendum.

[redacted]

General Partner

Limited Partner

The filing of a false public record, with the knowledge of its falsity, is a crime, subjecting the filer to the fine or imprisonment or both under R.S. 14:133.

SIGN →	To be signed by any partner	Title	Phone	Date
	Signee's address	Email Address		(For Office Use Only)

Enclose filing fee of $30.00

Return by: [redacted]

Make remittance payable to Secretary of State
Do Not Send Cash
Do Not Staple

To: Commercial Division
P. O. Box 94125
Baton Rouge, LA 70804-9125
Phone (225) 925-4704

web site: www.sos.louisiana.gov

DO NOT STAPLE

2

UNSIGNED REPORTS WILL BE RETURNED

Tom Schedler
Secretary of State

FOREIGN CORPORATION ANNUAL REPORT

For Period Ending
[redacted]

[redacted]

2015

Mailing Address Only (INDICATE CHANGES TO THIS ADDRESS IN THIS BOX) 1

[redacted]

(INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
Domicile Street Address in State Where Incorporated (Do not use P. O. Box)

[redacted]

Federal Tax ID Number

Our records indicate the following registered agents for the corporation. Indicate any changes or deletions below. All agents must have a Louisiana address. Do not use a P. O. Box.
A NEW REGISTERED AGENT REQUIRES A NOTARIZED SIGNATURE.

[redacted]

I hereby accept the appointment of registered agent(s).

New Registered Agent Signature

Sworn to and subscribed before me on
NOTARY NAME MUST BE TYPED OR PRINTED WITH NOTARY #

Notary Signature **Date**

This report reflects a maximum of three officers or directors from our records for this corporation. Indicate any changes or deletions below. Include a listing of all names along with each title held and their address. Do not use a P. O. Box. If additional space is needed attach an addendum.

[redacted] President, Director

[redacted] Secretary, Director

[redacted] Treasurer, Director

Our records indicate the following addresses for the corporation. Indicate any changes below.

Principal business office wherever located:
[redacted]
Registered office in Louisiana (Must be the same as agent's address):
[redacted]
Principal business establishment in Louisiana (Do not use a P.O. Box):
[redacted]

The filing of a false public record, with the knowledge of its falsity, is a crime, subjecting the filer to the fine or imprisonment or both under R.S. 14:133.

SIGN →	To be signed by authorized individual	Title	Phone	Date
	Signee's address	Email Address		(For Office Use Only)

Enclose filing fee of $30.00

Return by: [redacted]

Make remittance payable to Secretary of State
Do Not Send Cash
Do Not Staple

To: Commercial Division
P. O. Box 94125
Baton Rouge, LA 70804-9125
Phone (225) 925-4704

web site: www.sos.louisiana.gov

DO NOT STAPLE

3

UNSIGNED REPORTS WILL BE RETURNED

SAMPLE

Tom Schedler
Secretary of State

FOREIGN PARTNERSHIP ANNUAL REPORT

For Period Ending
~~4/30/2015~~

2015

Mailing Address Only (INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)

[redacted]

1

(INDICATE CHANGES TO THIS ADDRESS IN THIS BOX)
Principal Place of Business Outside Louisiana (Do not use P. O. Box)

[redacted]

Federal Tax ID Number

Our records indicate the following registered agents for the partnership. Indicate any changes or deletions below. The registered agent must have a Louisiana address. Do not use a P.O. Box.

[redacted]

Our records indicate the following municipal address of the principal place of business for the partnership in Louisiana. Indicate and changes below. Do not use a P. O. Box.

[redacted]

List the name and municipal address of the partner signing below. Do not use a P. O. Box.

The filing of a false public record, with the knowledge of its falsity, is a crime, subjecting the filer to the fine or imprisonment or both under R.S. 14:133.

SIGN →	To be signed by the partner	Title	Phone	Date
	Signee's address	Email Address		(For Office Use Only)

Enclose filing fee of $30.00

Make remittance payable to Secretary of State
Do Not Send Cash
Do Not Staple

web site: www.sos.louisiana.gov

Return by: [redacted]

To: Commercial Division
P. O. Box 94125
Baton Rouge, LA 70804-9125
Phone (225) 925-4704

DO NOT STAPLE

1

UNSIGNED REPORTS WILL BE RETURNED

CORPORATE RESOLUTION

EXCERPT FROM MINUTES OF THE BOARD OF DIRECTORS OF _____.

At the meeting of the directors of_____, duly noticed and held on _____, 20___, a quorum being there present, on motion duly made and seconded, it was:

RESOLVED, That _____, be and is hereby appointed, constituted and designated as agent and attorney-in-fact of the Corporation with full power and authority to act on behalf of this Corporation in all negotiations, bidding, concerns and transactions with the Caddo Parish School Board or any of its agents, departments employees or officers, including but not limited to, the execution of all bids, papers, documents, affidavits, bonds, sureties, contracts and acts and to receive and receipt therefore all purchase orders and notices issued pursuant to the provisions of any such bid or contract, this Corporation hereby ratifying, approving, confirming and accepting each and every such act performed by the said agent and attorney-in-fact.

I hereby certify the foregoing to be a true and correct copy of an excerpt of the minutes of the above dated meeting of the Board of Directors of said Corporation, and the same has not been revoked or rescinded.

_____

Secretary-Treasurer

Signed this _____ day of _____, 20___.

BID BOND

FOR

Caddo Parish School Board – Forest Hill Elementary School; HVAC Upgrade
CPSB Project Number 2027-752

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

That_____of_____, as Principal, and_____, as Surety, are held and firmly bound unto the _____ (Obligee), in the full and just sum of five (5%) percent of the total amount of this bid, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U. S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A - rating in the latest printing of the A. M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

_____

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

_____ _____

PRINCIPAL (BIDDER) SURETY

BY: _____ BY:_____

AUTHORIZED OFFICER-OWNER-PARTNER AGENT OR ATTORNEY-IN-FACT(SEAL)

Bid Envelope Checklist:

- ✓ Contractor Name
- ✓ Contractor Address
- ✓ License Number
- ✓ Project Name
- ✓ Project Number
- ✓ “Bid Enclosed”

Caddo Parish School Board
Forest Hill Elementary School
HVAC Upgrade **2027-752**
Name of Project **Project No.**

STATE OF _____

PARISH OF _____

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)
(b) Corrupt influencing (R.S. 14:120)
(c) Extortion (R.S. 14:66)
(d) Money laundering (R.S. 14:23)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)
(b) Identity Theft (R.S. 14:67.16)
(c) Theft of a business record (R.S.14:67.20)
(d) False accounting (R.S. 14:70)
(e) Issuing worthless checks (R.S. 14:71)
(f) Bank fraud (R.S. 14:71.1)
(g) Forgery (R.S. 14:72)
(h) Contractors; misapplication of payments (R.S. 14:202)
(i) Malfeasance in office (R.S. 14:134)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

Caddo Parish School Board
Forest Hill Elementary School
HVAC Upgrade **2027-752**
Name of Project **Project No.**

LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance

A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.

B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding / proposing entity.

_____ _____
NAME OF BIDDER **NAME OF AUTHORIZED SIGNATORY OF BIDDER**

_____ _____
DATE **TITLE OF AUTHORIZED SIGNATORY OF BIDDER**

_____
SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER/AFFIANT

Sworn to and subscribed before me by Affiant on the _____ day of _____ , 20___ .

_____
Notary Public

OPPORTUNTIY CADDO FAIR SHARE FORM 1A
Caddo Parish Public Schools

LIST OPPORTUNITY CADDO CERTIFIED BUSINESSES LISTED IN THE DIRECTORY THAT WERE SOLICITED; LIST OPPORTUNITY CADDO CERTIFIED BUSINESS BIDS RECEIVED AND/OR REJECTED

Opportunity Caddo Certified Businesses Listed In The Directory of Small & Economically Disadvantaged Businesses	Date/Time of Fax/Letter/Call	Type of Work	Bid Received Yes or No	Bid to Be Used Yes or No	Reason for Rejection

OPPORTUNTIY CADDO FAIR SHARE FORM 1B
Caddo Parish Public Schools

LIST OTHER BUSINESSES LISTED IN THE DIRECTORY THAT WERE SOLICITED;
LIST OTHER BUSINESSES IN THE DIRECTORY FROM WHICH YOU RECEIVED AND/OR REJECTED BIDS

Other Businesses Listed In The Directory of Small & Economically Disadvantaged Businesses	Date/Time of Fax/Letter/Call	Type of Work	Bid Received Yes or No	Bid to Be Used Yes or No	Reason for Rejection

OPPORTUNITY CADDO FAIR SHARE FORM 2
Caddo Parish Public Schools

SUBCONTRACTOR DATA SHEET to include **all** subcontractors. Please copy form if more space is needed.
(This completed form to be submitted within 48 hours of notice to proceed.)

PROJECT/BID# _____________ Project Name____

Prime Contractor Name and Phone Number: _______________________________________ Contact Person: ________________________________

Prime Contract Bid Amount: __________________ Federal Tax ID _________________________

Sub Federal Tax ID	Subcontractor Name/Address/Phone Number	Sub Contract Amt.	Type of Work	State License Number	State Class	* Status Codes (check as many as apply)	** ✔
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	
		$				☐AAB ☐AIB ☐HAB ☐LBE ☐MBE ☐OCC ☐SBE ☐WBE	

AAB (African American Business) AIB (Asian or Indian Business) HAB (Hispanic American Business) LBE (Large Business Enterprise) MBE (Minority Business Enterprise) OCC (Opportunity Caddo Certified) SBE (Small Business Enterprise) WBE (Women Business Enterprise)

**** Indicate if the Subcontractor is going to hire other Subcontractors. Also list 2nd Tier Subcontractors on this form.**

I hereby certify that the above information is true and correct and that I will notify the Fair Share Administrator, in writing, of any changes that occur prior to completion of the work.

Prime Contractor's Signature _______________________________________ Date ______________________

OPPORTUNTIY CADDO FAIR SHARE FORM 3
Caddo Parish Public Schools
MONTHLY SUBCONTRACTOR UTILIZATION REPORT
(This completed form to be submitted monthly during the project work)

1. Contract No. _____ 2. Progress Report No. _____ 3. Prime Contractor _____

4. Prime Contract Amount _____ 5. Report Dates (Beginning & Ending) _____ 6. Project Name _____

SECOND TIER PAYMENTS TO SUBCONTRACTORS MUST BE INCLUDED ON THIS REPORT.

7 Name of All Sub-Contractors	8 Status Codes (See Form 1)	9 ✓ Check if Second Tier Sub	10 Nature of the Work	11 Original Sub-Contract Amount ($)	12 Changes to the Sub-Contract Amount ($)	13 Total Sub-Contract Amount ($)	14 Mid-Month Payment Amount/Date Made to Subcontractor ($)	15 Actual Progress Payment Amount/Date Made to Sub-Contractor ($)	16 Total (all) Mid-month & Progress Payment Amounts for Month ($)	17 Total Retainage Held, if Any ($)

*CHANGES TO CONTRACT: Replacement, substitution or addition of subcontractors must be handled in conformance with the contract documents. Please Note: Instructions for completing this report are on the reverse side or the next page.

IT IS HEREBY CERTIFIED THAT THE ABOVE LISTED FIRMS HAVE BEEN UTILIZED BY OUR COMPANY IN THE AMOUNTS REPRESENTED ABOVE AND THAT THE INFORMATION CONTAINED HEREIN IS COMPLETE AND ACCURATE.

Authorized Signature of Contractor Representative _____ Date _____

Printed Name of Contractor Representative _____

Instructions: Submit with request for Progress Payment to Project Managers **and** send a copy to Caddo Parish School Board, Fair Share Administration, 1961 Midway Avenue, Shreveport, LA 71108 or P.O. Box 32000; Shreveport, LA 71130-2000

INSTRUCTIONS FOR OPPORTUNITY CADDO FAIR SHARE FORM 3 - MONTHLY SUBCONTRACTOR UTILIZATION REPORT

1. CONTRACT NUMBER: Enter the contract number for this project as assigned by the Caddo Parish School Board.
2. PROGRESS REPORT NO: Enter Report number 1 for the first report submitted and subsequent numbers for reports submitted thereafter.
3. PRIME CONTRACTOR: Indicate the name of the prime contractor.
4. PRIME CONTRACT AMOUNT: Indicate the total dollar amount of the prime contract.
5. REPORT DATES: Indicate the beginning and ending dates corresponding to the progress payment period or use calendar month. Example: 1/1/05 thru 1/31/05. Reports should be sequential and not overlap.
6. PROJECT NAME: Indicate the project name as indicated on the contract documents
7. SUBCONTRACTOR NAME: List the names of all subcontractors having performed work or paid on this project during the reporting period.
8. STATUS CODES: Indicate the appropriate SEDB status codes of each contractor listed in item 7 (See Form 2 for status codes).
9. PLACE A (✓) IF A SECOND TIER SUBCONTRACTOR.
10. NATURE OF WORK: Briefly describe subcontractors' work. Example: Landscaping, electrical supplier, electrical contractor, remove and replace inlets, furnish and install catch basin, etc.
11. ORIGINAL CONTRACT AMOUNT: Indicate the dollar amount for each subcontract at time of award.
12. CHANGES TO CONTRACT: Indicate the cumulative dollar value of any changes to subcontracts. Additions to the contract should be shown using a plus sign in front of the amount and reductions in contract amounts using the minus sign. Examples: additions +$3,050.50, reductions -$3,050.50. Also please explain any changes in space provided below for comments.
13. TOTAL SUBCONTRACTOR AMOUNT: This amount should be the total dollar value (current contract amount) plus or minus changes indicated in column 11.
14. MID-MONTH PAYMENT AMOUNT AND DATE MADE TO SUB: Enter the date and amount of any mid-month payment made to the subcontractor.
15. ACTUAL PROGRESS PAYMENT AMOUNT AND DATE MADE TO SUBCONTRACTOR: Enter the date and amount of the month end actual progress payment that was made to the subcontractor.
16. TOTAL PAYMENT AMOUNT TO DATE: This amount should represent the amount of both mid-month and month-end amounts paid to the subcontractor. This amount should correspond to the amount the prime is requesting for work performed by the subcontractor for the same reporting period.
17. RETAINAGE HELD, IF ANY: If the prime is holding retainage, enter the total amount of the retainage held for the reporting period.

COMMENTS (Include why any payment amounts made to the subcontractor are less than that requested by the subcontractor.

Opportunity Caddo Vendor List on CPSB Website

Go to CPSB website (caddoschools.org)

Select tab ***Departments***

Select ***Purchasing***

Select ***Opportunity Caddo Program***
(Above Department Staff Members)

Select ***OCP-Registered Businesses***

CONTRACTOR GUIDELINES

1.1 Use of Air Conditioning and utilities at School Facilities

Air Conditioning shall not be used except for the following:

- Where the temperature is in excess of 100 degrees while working indoors.
- Where it is required to perform the function of work.
- Note: Fans may be used for ventilation. Any abuse of Air conditioning by the Contractor shall result in a fine of $100 per day per occurrence.

1.2 Use of Electricity

Electricity may be used for fans and radios or where it is required to perform the function of work.

Lights are to be shut off when not in use.

1.3 Use of Telephone

School Board telephone lines shall not be used for long distance calls.

The Contractor shall be billed for any long distance calls he or his personnel make.

1.4 Use of Plumbing/Water

Plumbing and water may be used only where it is required to perform the function of work.

1.5 Other Utilities

Should the Contractor require any utilities beyond the above described he shall contact the CPSB-Construction Department Project Manger and have approved in writing his request for Utilities and the price of usage.

2. Use of refuse containers.

Contractor shall provide refuse containers for all construction refuse.

3. Hours of Work

Summer hours of work are 7:00 a.m. to 3:30 p.m. Monday through Friday, except national holidays. Contractor must have prior approval from Construction Department to work outside of these hours. Daily schedules of work must be reported to Construction Department and Security (635-0416) in advance.

4. Access to Building

Custodian provides access during regular hours of work. Contractor may be issued keys with approval of Construction Department Project Manager and Principal, if requested at least 48 hours in advance. Contractor is liable for any property loss, theft or vandalism that occurs due to breech of security by contractor working after hours. Custodian may not work overtime unless contractor agrees in advance to pay hourly rates.

5. Disruptions

Contractor shall keep school site in a clean, safe condition daily. Utilities may not be interrupted without prior approval of Construction and Capital Projects. Contractor work is to be completed, or clean and vacated one week prior to the first day for students. After this date the school Principal must approve work hours.

Signed: (Name) _____ Date: _____

Company: _____

AFFIDAVIT - - CONTRACTOR
STATE OF LOUISIANA
PARISH OF CADDO

This _____ day of _____, 20___

personally came and appeared before me, the undersigned Notary Public, duly commissioned and qualified within and for the Parish of_____, State of _____,

_____

represented herein by: _____

who after being by me duly sworn did depose and say that he has been selected as Contractor for the Caddo Parish School Board on the

_____

and that he does hereby certify in compliance with L.R.S. 38:2224, that he has employed no person, corporation, firm, association or other organization, either directly or indirectly, to secure the contract of the above mentioned public project, other than persons regularly employed by him who services in connection with the construction of said public project or in securing the contract for same where in the regular course of their duties for him; and, that no part of the contract price received, or to be received by him was paid or will be paid to any person, corporation, firm association or other organization for soliciting the contract, other then the payment of their normal compensation to persons regularly employed by him whose services in connection with the construction of said public project were in the regular course of their duties for him.

APPEARER FURTHER DECLARES that he will, in all respects, comply with the public contract laws of the State of Louisiana, including Title 38 of the Louisiana Revised Statues, and particularly Section 2219 of said Title 38 of the Louisiana Revised Statues.

_____

Sworn to and subscribed before me this _____ day of _____, 20____.

_____
Notary Public

CERTIFICATE OF INSURANCE for CADDO PARISH SCHOOL BOARD

Insurance Provider:	Insured:
Project Name and Number: Forest Hill Elementary School HVAC Upgrade #2027-752	

Coverages:

Type of Insurance	Policy Number	Policy Effective Date	Policy Expiration Date	Limits	
General Liability				Ea. Occurrence	
Commercial				Fire Damage	
Occur				Med. Exp.	
				Personal & Adv Injury	
				General Aggregate	
				Product-Comp/OP AGG	
Automobile Liability				Each Occurrence	
				Bodily Injury-ea. Person	
				Bodily Injury-ea. Occcurrence	
				Property Damage	
Umbrella Liability or Excess Liability				Each Occurrence	
				Aggregate	
Workers Compensation & Employers Liability				WC statutory limits	
				Accident	
				EL Disease Ea. Employee	
				Disease-Policy limit	
Contractors Protective Liability					
Owners Protective Liability					
Architects & Engineers Professional Liability				Per Claim	
				Annual Aggregate	
				Deductible	
Builders Risk OR Floaters Insurance					

Description of Operations / Locations / Vehicles (Accord 101, Additional Remarks Sechdule, may be attached as more space is required
The certificate holder is an Additional insured and contains Waiver of Subrogation on the General Liability and Excess policies as required by written contract subject to policy terms, conditions and exclusions.

CERTIFICATE HOLDER:	**AUTHORIZED REPRESENTATIVE:**
Caddo Parish School Board 1961 Midway Shreveport, LA 71108	

PERFORMANCE & PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT WE, the undersigned_____, hereinafter referred to as Principal, and the _____a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the Sate of Louisiana, hereinafter referred to as Surety, are held and firmly bound unto CADDO PARISH SCHOOL BOARD, hereinafter referred to as Owner, in the penal sum of _____, lawful money of the United States, for the payment of which well and truly to be made, the said Principal and the said Surety do hereby bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally by these presents, as follows:

THE CONDITION OF THE OBLIGATION IS SUCH THAT: Whereas the Principal, by an instrument in writing attached hereto and bearing date of _____(CONTRACT DATE) has agreed with said Owner to furnish all material and equipment and do all work necessary to furnish labor, material, tools, and equipment to construct _____in _____ Louisiana, in accordance with specifications and drawings prepared by _____ Architect, _____, Louisiana, which specifications and drawings are referred to and made a part hereto to the same extent as if set forth at length herein.

NOW THEREFORE, if said Principal shall well and truly in good, sufficient, and workmanlike manner and to the satisfaction of Owner, perform and complete the work required, and shall defend, indemnify and save harmless said Owner against all damages, claims, demands, expense and charge of every kind arising from any act, omission or neglect of said Principal, its agent, servants or employees with relation to said work; and shall pay all costs, charges, rentals, and expenses for labor, material, supplies and equipment, and deliver the said construction to the Owner completed and ready for occupancy or operation, and free from all liens, encumbrances or claims for labor, material or otherwise, and shall pay all other expense lawfully chargeable to the Owner by reason of any default or neglect of the said Principal in the relation of said agreement and said work, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED FURTHER, that the Surety for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or the work to be performed thereunder, or the specifications accompanying the same, shall in anyway affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration, or addition to the terms of the contract, or to the work, or to the specifications:

PROVIDED FURTHER, that the Principal, or its sub-contractor or sub-contractors fail to duly pay for any labor, materials, team hire, sustenance, provisions, provender or any other supplies or materials used or consumed by such Principal or its sub-contractor: in performance of the work contracted to be done, the Surety will pay the same in any amount not exceeding the sum specified in the bond, together with interest as provided by law.

IN WITNESS WHEREOF, said Principal and Surety have hereunto set their hands and seals at Shreveport, Louisiana, this _____ day of _____, 20___.

WITNESSES:

_____ _____

(Principal)

_____ By:_____

_____

Address

WITNESSES:

_____ _____

(Surety)

_____ By: _____

Attorney-in-Fact

Local Agent: _____

Address: _____

Phone: _____

LOUISIANA DEPARTMENT of REVENUE
TAX POLICY & PLANNING
Revenue Information Bulletin

Revenue Information Bulletin No. 25-023
August 14, 2025

Sales Tax

2025 Regular Session
Exemption for General Contractors and Subcontractors of Public Projects

Act 384 of the 2025 Regular Session of the Louisiana Legislature extended the governmental sales tax exemption in La. R.S. 47:305.7(A), effective July 1, 2025. The state and local sales and use tax exemption now applies to certain purchases made by general contractors and their subcontractors when performing work pursuant to construction contracts for the state, local governments, or any agency, board, commission or instrumentality of the state ("public projects")[1]. The exemption is limited to purchases of materials and equipment rentals for the construction contract.

General contractors and their subcontractors must each complete and submit a separate Form R-85012, *Public Projects Contractor/Subcontractor Certification and Exemption Application*[2], electronically, through Louisiana Taxpayer Access Point ("LaTAP"),[3] along with a copy of the contract. The application shall include the job description, contract number, state or local government entity identifying information, and valid dates or a date range for the construction project. Taxpayers must have a LaTAP account to use the electronic application and access their exemption certificate. An application may be submitted for a public project contract that was executed prior to July 1, 2025. However, the exemption does not apply to purchases made prior to July 1, 2025.

Upon approval, Form R-85014, *Public Projects Contractor/Subcontractor Certification and Sales Tax Exemption Certificate* will be issued and must be presented to vendors when making purchases. Local sales and use tax collectors shall accept the exemption certificates issued by the Department of Revenue. General contractors and subcontractors may not use the Form R-1056, *Purchases by Political Subdivisions of the State of Louisiana*. Form R-1056 may only be used by political subdivisions of Louisiana. Also, general contractors and subcontractors who have been designated as an agent of a governmental entity by using the Form R-1020, *Designation of Construction Contractor as Agent of a Governmental Entity* are

[1] La. R.S. 47:305.7(A)(1)(b)
[2] Pending availability of the electronic application in LaTAP, taxpayers may use the paper form, Form R-85012-T, *Public Projects Contractor/Subcontractor Sales Tax Certification and Exemption Application*. Upon approval, an exemption certificate will be mailed to the taxpayer if not yet available in LaTAP.
[3] A LaTAP account can be created by following this link.

not required to obtain a Form R-85014. The R-1020 allows for the purchase of construction materials, services, leases and rentals without the payment of tax.

Pursuant to La. R.S. 47:305.7(A)(1)(c), the exemption does not apply to general contractors or subcontractors making purchases related to payment in lieu of taxes ("PILOT") agreements or other similar agreements executed after July 1, 2025, unless the agreement is approved by the secretary of the Department of Revenue ("LDR") and the secretary of the Louisiana Economic Development ("LED"). Requests for approval of PILOT agreements should be submitted to LDR first at LDRPILOTrequests@la.gov. Once approved by LDR, the request will be forwarded to LED.

Questions about completing the Form R-85012 should be emailed to LDRSales.ExemptionApplications@la.gov. Questions concerning this Bulletin should be directed by e-mail to Policy@la.gov.

Richard Nelson
Secretary

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Forest Hill Elementary School HVAC Upgrade
2005 Francais Drive
Shreveport, LA 71108
Project No. 2027-752

THE OWNER:
(Name, legal status and address)

Caddo Parish School Board
1961 Midway Street
Shreveport, LA 71108-2201

THE ARCHITECT:
(Name, legal status and address)

Aillet, Fenner, Jolly & McClelland, Inc.
3003 Knight Street, Suite 120
Shreveport, LA 71105

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.

TABLE OF ARTICLES

INDEX
(Topics and numbers in bold are Section headings.)

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, 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 and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

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

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

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

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

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, 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. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 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 under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the 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 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.

§ 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 Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the 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.

§ 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 Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (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 14 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. 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.

§ 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 and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect 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 or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information 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 Architect's approval. The Architect'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 reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 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, 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 is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is 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 without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect 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.

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

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

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional,

whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 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 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 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.

§ 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 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 bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 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.

§ 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 date the Architect issues the final Certificate 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 include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect 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 Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. 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 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 prepare 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 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 Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner 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. 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 and waiver of subrogation.

§ 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.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each 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, Separate Contractors, and the Owner until subsequently revised.

§ 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 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.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed 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 Architect and signed by the Owner 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 the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the 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 Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect'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 and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect 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 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 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.

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

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect 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 Architect. This schedule, unless objected to by the Architect, 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 Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect 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 or Architect 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 Architect, but not yet included in Change Orders.

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all 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 Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect'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 either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 If the Architect withholds certification 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 Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

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

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

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

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

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

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate 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 certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so 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 will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the 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.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect 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 on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor 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 and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

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

- **.1** employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; 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.

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 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.

§ 10.3.2 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.

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 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the 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 to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner 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 place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the 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 Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the 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 Architect.

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

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the 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 Work 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 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.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the 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.

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

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

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTAL CONDITIONS OF THE CONTRACT
BY AND BETWEEN
CADDO PARISH SCHOOL BOARD
AND
CONTRACTOR
AIA DOCUMENT A201-2017

January 1, 2026

(References are to Articles, Paragraphs, Subparagraphs and Clauses of the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition)

THESE SUPPLEMENTAL CONDITIONS ARE INTENDED TO MODIFY, DELETE FROM OR ADD TO, SUBSTITUTE FOR AND/OR REPLACE THE TERMS AND CONDITIONS OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, AIA A201, 2017 EDITION, DESCRIBED ABOVE. IN THE EVENT OF ANY CONFLICT BETWEEN THESE SUPPLEMENTAL CONDITIONS AND THE TERMS AND CONDITIONS OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, THESE SUPPLEMENTAL CONDITIONS SHALL CONTROL.

ARTICLE 1
GENERAL PROVISIONS

BASIC DEFINITIONS

1.1.1. The Contract Documents

In Section 1.1.1 delete the third sentence, and add the following sentence:
The Contract Documents shall include the Bid Documents as listed in the Instructions to Bidders and any modifications made thereto by addenda.

1.1.8 Initial Decision Maker

Delete all after the words, “shall not show partiality to the Owner or Contractor”.

1.2.3.1 Add as follows:

In general, the Drawings are intended to nominate and establish the location, quantity and relationship of work, and the Specifications are intended to define the type and quality of materials and workmanship requirements of the work shown. In cases of conflict between the Drawings and Specifications or with either, the Contractor shall submit prompt request for direction before proceeding. The requirements for the greatest quantity or the highest quality shall govern unless otherwise directed.

1.2.3.2 Add as follows:

When a requirement is made by the Contract Documents that is not possible to meet, such as the requirements for an unavailable material, the Contractor shall submit prompt notice to the Architect for direction under Article 4.2.1.

1.2.4 Add as follows:

Before bidding, ordering any material or doing any work, each contractor shall verify all measurements and conditions, existing and new, at the jobsite and be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of difference between actual dimensions and conditions and the ones indicated on the Drawings.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE [REFER TO *La R.S. 38:2317*]

1.5.1 Delete the first sentence of the paragraph.

1.5.1 In the third sentence: delete the remainder after the word "publication".

1.7 DIGITAL DATA USE AND TRANSMISSION

In the first sentence after the words, "in digital form" delete ". The parties will use AIA Document E203 2013, Building Information Modeling and Digital Data Exhibit".

1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Delete Section 1.8.

ARTICLE 2
OWNER

2.1.2 Delete 2.1.2 in its entirety and substitute the following subarticle:

The Owner reserves the right to observe the Work at any time. The presence of the Owner or its representatives at the project site does not imply concurrence or approval of the Work. The Contractor shall call specific items to the attention of the Architect if the Contractor wishes an opinion.

2.1.3 Add new section 2.1.3 as follows:

Unless otherwise provided in the Contract Documents, the Architect will furnish to the Contractor, free of charge, up to twenty-four (24) copies of Contract Documents. Additional copies may be purchased by the Contractor by paying actual printing and mailing costs.

2.2 EVIDENCE OF THE OWNER'S FINANCIAL ARRANGEMENTS

Delete Section 2.2 in its entirety.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete Section 2.3.2 and substitute the following:

2.3.2 The term Architect, when used in the Contract Documents, shall mean the prime Designer (Architect, Engineer, or Landscape Architect), or his authorized representative, lawfully licensed to practice architecture, engineering, or landscape architecture in the State of Louisiana, identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

2.3.3 Delete in its entirety.

ARTICLE 3
CONTRACTOR

3.4 LABOR AND MATERIALS

3.4.2 Delete Section 3.4.2.

Delete Section 3.4.3 and substitute with the following:

3.4.3 Contractor and its employees, officers, agents, representatives, and Subcontractors shall conduct themselves in an appropriate and professional manner, in accordance with the Owner's requirements, at all times while working on the Project. Any such individual who behaves in an inappropriate manner or who engages in the use of inappropriate language or conduct while on Owner's property, as determined by the Owner, shall be removed from the Project at the Owner's request. Such individual shall not be permitted to return without the written permission of the Owner. The Owner shall not be responsible or liable to Contractor or any Subcontractor for any additional costs, expenses, losses, claims or damages incurred by Contractor or its Subcontractor as a result of the removal of an individual from the Owner's property pursuant to this Section. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.5 WARRANTY

3.5.2 Replace reference to "Section 9.8.4" with "Section 9.8.6".

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS (La R.S. 40:1724[A])

3.7.4 Delete "14" and substitute "7"

Delete Section 3.7.5 and substitute the following:

3.7.5 If, during the course of the Work, the Contractor discovers human remains, unmarked burial or archaeological sites, burial artifacts, or wetlands, which are not indicated in the Contract Documents, the Contractor shall follow all procedures mandated by State and Federal law, including but not limited to La R.S. 8:671 et seq., the Office of Coastal Protection and Restoration, and Sections 401 & 404 of the Federal Clean Water Act. Request for adjustment of the Contract Sum and Contract Time arising from the existence

of such remains or features shall be submitted in writing to the Owner pursuant to the Contract Documents.

3.8 ALLOWANCES

Delete Sections 3.8.1, 3.8.2, and 3.8.3 in their entirety and add the following new Section 3.8.1:

3.8.1 Allowances shall not be permitted or made on any of the Work or any item.

3.9 SUPERINTENDENT

3.9.1 At the end of the section 3.9.1 add the following:

Contractor has designated to serve as superintendent for the Work, and he shall not be transferred from the Work without Owner's consent (which shall not be unreasonably withheld). If Owner or Architect reasonably determines that any employee of Contractor, including the superintendent and his staff, or any of its subcontractors is careless, not qualified to perform the work assigned to him, or, in Owner's sole judgment, is not performing his task or working with Owner and/or Contractor's subcontractors in good faith, and Owner and Contractor cannot, after a diligent and good faith attempt, agree what action should be taken with respect to the removal or reassignment of such employee, at the request of Owner, Contractor shall promptly remove such employee from the work and replace such employee. Such replacement shall be subject to Owner's approval. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

3.10.1 Add the following: For projects with a contract sum greater than $1,000,000.00, the Contractor shall include with the schedule, for the Owner's and Architect's information, a network analysis to identify those tasks which are on the critical path, i.e., where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment shall be made until this schedule is received.

3.10.3 In the first sentence, delete the word "general".

After the first sentence, add the following:
If the Work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the Work on schedule, then the Contractor shall be deemed in default under this Contract and the progress of the Work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with Section 14.2.

Add the following Sections:

3.10.4 Add the following: Submittal by the contractor of a schedule or other documentation showing a completion date for his Work prior to the completion date stated in the

contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

3.10.5 In the event the Owner employs a commissioning consultant, the Contractor shall cooperate fully in the commissioning process and shall require all subcontractors and others under his control to cooperate. The purpose of such services shall be to ensure that all systems perform correctly and interactively according to the provisions of the Contract Documents.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following: This requirement is of the essence of the contract. The Architect shall determine the value of these documents and this amount shall not be approved for payment to the Contractor until all of the listed documents are delivered to the Architect in good order, completely marked with field changes and otherwise complete in all aspects.

ARTICLE 4
ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 In the first sentence, delete the phrase: "the date the Architect issues the final Certificate for Payment" and replace with the phrase "final payment is due, and with the Owner's concurrence, from time to time during the one year period for correction of Work described in Section 12.2."

4.2.2 In the first sentence, after the phrase: "become generally familiar with"; insert the following: "and to keep the Owner informed about".

In the first sentence, after the phrase "portion of the Work completed", insert the following: "to endeavor to guard the Owner against defects and deficiencies in the Work,"

4.2.4 In the first sentence, delete all after "The Owner and Contractor", and add the following "may communicate directly with each other, when deemed necessary by the Owner, and the Owner will notify the Architect of any decision."

4.2.8 Add the following sentence at the end of Section 4.2.8:
Notwithstanding any other provision of this Agreement to the contrary, the Architect shall have no authority unilaterally to order or approve any material deviation from the Contract Documents, whether or not such deviation affects the Contract Sum or the Contract Time. In the event any such deviation is sought, prior written approval from Owner must be obtained from Contractor and Owner.

4.2.10 Add the following sentence to the end of Section 4.2.10: There shall be no restriction on the Owner having a Representative.

4.2.11 Add the following sentence to the end of Section 4.2.11:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.
The Owner shall not provide any explanation or interpretation of the CONTRACT DOCUMENTS.

4.2.14 Insert the following sentence between the second and third sentences of Section 4.2.14:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

Add the following at the end of this subparagraph:

4.2.15 Contractor shall attend all regularly scheduled and specially called meetings by and among Owner, Architect, Contractor and/or Owner's contractors. The representative of Contractor at such meeting shall have authority to make decisions on behalf of Contractor and to bind Contractor to any commitments made at such meetings by such representative, to the extent, and only to the extent that such commitments relate to job safety, job scheduling and job site management.

ARTICLE 5
SUBCONTRACTORS

5.1.3 Add this new Subparagraph:

Contractor shall include the following provision in all of its subcontracts and purchase orders: This Contract is for Owner's benefit, its successors and assigns who, as well as Contractor, may directly enforce all rights and warranties, express or implied herein, but Subcontractors shall have recourse only against Contractor and not against Owner. Owner may rely solely upon Contractor for enforcement of all Subcontracts. To effect such purpose, Contractor conditionally assigns to Owner all right to bring any actions against Subcontractors and material vendors without waiver by Owner of its right against Contractor because of defaults, delays and defects or other impacts for which a Subcontractor or material vendor may also be liable; provided, however, Contractor shall have the sole right to bring actions against the Subcontractors unless Contractor has defaulted hereunder (and such default remains uncured) or Owner has terminated the Contract as a result of such default, whereupon Owner shall have such right.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete Section 5.2.1, and substitute the following:

5.2.1 Unless otherwise required by the Contract Documents, the Contractor shall furnish at the Pre-Construction Conference, to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment

fabricated to a special design) proposed for each of the principal portions of the Work. No Contractor payments shall be made until this information is received.

Delete Section 5.2.2, and substitute the following:

5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete Sections 5.2.3 and 5.2.4 and substitute the following:

5.2.3 The Contractor shall notify the Architect and the Owner when a subcontractor is to be changed and substituted with another subcontractor.

5.3 Add the following sentence to the end of Section 5.3

Contractor shall assure that in all of its contracts with its subcontractors, such subcontractors are bound by the requirements of this agreement, insofar as applicable to such subcontractors. Further, such contracts shall provide that Contractor may assign its contract with each such subcontractor to Owner.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete Sections 5.4, 5.4.1, 5.4.2 and 5.4.3

ARTICLE 7
CHANGES IN THE WORK

(Delete Articles 7.1 and 7.2 and substitute the following):

7.1 CHANGE IN THE WORK

7.1.1 A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing a change in the work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. Any reservation of rights, stipulation, or other modification made on the change order by the contractor shall have no effect.

7.1.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents. If the Contractor and Owner, or if the Contractor, Architect and Owner do not agree on the proposed cost of a Change Order, or interpretation of the documents, the Contractor shall proceed with executing the work and submit a claim, as provided herein.

7.1.3 The cost to the Owner resulting from a change in the work shall be the sum of: Contractor's material and labor cost,

Subcontractor's and/or Sub-Subcontractor's (defined in Article 5) material and labor cost, and overhead and profit.

The credit to the Owner resulting from a change in the Work shall be the sum of:

Contractor's material and labor cost, and Subcontractor's and/or Sub-Subcontractor's material and labor cost.

Credit will not be required for overhead and profit.

7.1.3.1 Before a Change Order is prepared, the Contractor shall provide and deliver to the Architect the following information, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

An itemized list of material and labor costs for each Subcontractor's and/or Sub-subcontractor's work, including quantities and unit cost for each item of labor and each item of material.

An itemized list of material and labor costs for the General Contractor's work including quantities and unit costs for each item of labor and each item of material.

Overhead and profit shall be computed by one of the following methods (not to exceed 25% on any portion of work):

.1 When all of the work is all General Contract work, 15% of the cost of the work as defined hereafter.

.2 When the work is all Subcontract work, 15% of the cost of the work for Subcontractor's overhead and profit plus 10% of the cost of work for General Contract's overhead and profit.

.3 When the work is a combination of General Contract work and Sub-contract work, 15% of the cost of Subcontract work for Subcontractor's overhead and profit plus 10% of the cost of the Subcontractor's work for General Contractor's overhead and profit plus 15% of the cost of General Contract work for General Contractor's overhead and profit.

7.1.3.2 The Contractor shall include extensions of time if any with Change Order requests and shall submit substantiation for such extension of time.

7.1.3.3 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.1.3.4 Cost of the work for the purpose of Change Orders shall be costs necessarily incurred in performance of the work and paid by the Contractor which shall consist of:

Wages paid.

Cost of all materials and supplies.

Cost of necessary machinery and equipment.

Cost of applicable taxes, insurance, fringe benefits, unemployment compensation, social security, old age, bond premiums, and any other documented costs.

7.1.3.5 Subcontract cost shall consist of the items in 7.1.3.4 above plus overhead and profit as defined in 7.1.3.1

7.1.3.6 Cost of the work whether General Contract cost of Subcontract cost shall not apply to the following:

Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

Expenses of the Contractor's principal office, branch office and the field office.

Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the work.

Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in cost of the work.

Cost of supervision not specifically required by the Change Order.

Cost due to the negligence of the Contractor, any Subcontractor or Sub-Subcontractor, anyone directly involved may be liable, including but not limited to the correction of defective or nonconforming work, disposal of materials and equipment wrongly supplied, making good any damage to property, or delays caused by failure to provide adequate Change Order documentation.

7.1.3.7 When applicable, as provided by the Contract, the cost to the Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

7.1.4 As part of the pre-construction conference submittals, the Contractor shall submit the following prior to the Contractor’s initial request for payment:

7.1.4.1 Fixed job site overhead cost itemized with documentation to support daily rates.

7.1.4.2 Bond Premium Rate with supporting information from the General Contractor’s carrier.

7.1.4.3 Labor Burden by trade for both Subcontractors and General Contractor. The Labor Burden shall be supported by the Worker’s Compensation and Employer’s Liability Insurance Policy Information Page. Provide for all trades.

7.1.4.4 Internal Rate Charges for all significant company owned equipment.

7.1.5 If the General Contractor fails to submit the aforementioned documentation as part of the pre-construction submittals, then pay applications shall not be processed until such time as the Owner receives this information.

7.1.6 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 In the first sentence after “following methods” insert: “, but not to exceed a specified amount”.

7.3.4 From .1 of the list, delete all after “Costs of labor, including” and substitute the following “social security, old age and employment insurance, applicable payroll taxes, and workers’ compensation insurance;”

Delete Section 7.3.9 and substitute the following:

7.3.9 Pending final determination of the total costs of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties’ agreement with part or all of such costs.

ARTICLE 8
TIME

8.1 DEFINITIONS

Add the following:

8.1.2 The first sentence is revised as follows: "The date of commencement of the Work is the date established in the written Notice to Proceed."

8.1.5 (Add new Subarticle):

The Date of Beneficial Occupancy shall be the date when a certain portion or portions of the project are complete to a point where they can be occupied by the Owner for the purpose it was constructed.

8.1.6 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

8.2 PROGRESS AND COMPLETION

Add to Section 8.2.1 the following:

Time is of the essence and completion of the Work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence Work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor’s Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the Work is substantially complete. Contractor agrees to pay the sum of for each consecutive calendar day for which work is not complete beginning with the first day beyond the completion date and all approved extensions of time.The Owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete Section 8.2.2.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 In the first sentence after the words "Owner pending" delete the words "mediation and binding dispute resolution" and add the word "litigation", and delete the last word "determine" and add the following: "recommend, subject to Owner's approval of Change Order. If the claim is not made within the limits of Article 15, all rights for future claims for that month are waived."

8.3.2 Add the following sentence at the end of the Section:
The Contractor shall give the Owner written notice of any delay, including delay caused by the Architect, as soon as possible but in any event within seventy two (72) hours of the beginning of the delay.

8.3.3 Delete the entire Subparagraph and replace with the following:
The sole remedy Contractor is entitled to receive by reason of unusual weather, labor dispute, fire, unavoidable casualties, or unusual delivery delays beyond the Contractor's control, shall be a time extension, plus reasonable costs and profits. In the case of other matters delaying Contractor's performance, which are determined under this contract to be the fault of the Owner or the Architect or any other party for whom Owner is responsible, Contractor and its subcontractors will be entitled to compensation for the cost of the extended overhead for the delay period in addition to a time extension, plus reasonable costs and profits.

ARTICLE 9
PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

Delete Section 9.1.2.

9.2 SCHEDULE OF VALUES

Delete Section 9.2 and substitute the following:
At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:
9.2.1.1 The Schedule of Values Form of submittal shall be on continuation sheet of application and certificate for payment, AIA Documents G702-G702A.

9.2.1.2 Use the Index of this Project Manual as a basis for format for listing costs of work for Sections under Division 1 through 16. Use each Section number under each Division for subtitles. Each Section shall be subdivided into separate line items for the total cost (with overhead and profit) of separate items in Sections.

9.2.1.3 The Total of all items shall equal the Total Contract Sum.

This schedule, when approved by the Architect, shall be used only as a basis for the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

Delete Sections 9.3.1, 9.3.1.1, and 9.3.1.2 and substitute the following:

9.3.1 Monthly, the Contractor shall submit to the Architect an itemized Application and Certificate for Payment on AIA Documents G702-G702A, notarized if required, supported by such data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated in the work and of material suitably stored at the site as of the twenty-fifth day of the preceding month, less ten percent (10%) retainage; or five percent (5%) if the construction/renovation contract exceeds five hundred thousand dollars ($500,000.00)

9.3.1.1 The retainage shall not be due the Contractor until expiration of the lien period established by Louisiana law for public works and submission to the Architect of a clear lien certificate and application for same.

9.3.1.2 Payments less retainage shall be the portion of the Contract Sum properly allocable to materials and equipment incorporated in the work and the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, no later than seven (7) days prior to the date on which the application for payment is submitted, less the aggregate of previous payments to Contractor. Upon Substantial Completion of the entire work, Owner shall make payment of a sum sufficient to increase the total payments to the Contract Sum, less retainage and less additional amounts as the Architect shall determine for all incomplete work and unsettled claims.

Notice of default by the Contractor or Subcontractor shall make the subparagraph null and void.

Delete Section 9.3.2 and substitute the following:

9.3.2 Add Section 9.3.2:

All requests for payment shall include owner's project number and owner's purchase order number, and may not exceed the amount of approved purchase order. In each Application for Payment, the Contractor shall certify as to subcontractors as follows: All due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current Application for Payment, and waivers of claim from all subcontractors and materialmen for which payment was made to the extent of payment received from the last advance made by the Owner have been obtained.

9.4 CERTIFICATES FOR PAYMENT

Add the following subparagraph:

9.4.3 The issuance of a Certificate for Payment by the Architect shall constitute a recommendation to the Owner in respect to the amount to be paid. This recommendation is not binding on the Owner if in Owner's opinion legitimate reasons for nonpayment exist including but not limited to the reasons set out in Paragraph 9.5.1. If the Owner declines to make payment upon a Certificate of Payment, the Owner shall promptly notify the Contractor of the reasons therefor.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Section 9.5.1.7: Delete the word “repeated”.

Add the following subparagraph:

9.5.1.8 The Contractor shall receive no further monthly progress payments once the project completion time has passed until the project is declared Substantially Completed.

Add the following at the end of 9.5.2:

Contractor shall nevertheless expeditiously continue to prosecute the Work but shall be entitled to make a Claim as provided in Article 15.

Delete Section 9.5.4.

9.6 PROGRESS PAYMENTS

Add the following at the end of 9.6.1

Notwithstanding the foregoing, Owner may withhold payment as provided in Paragraph 9.4.3. Further, if Contractor is not current in its obligations to a supplier, laborers and/or subcontractors on the Project, Owner may (but is not obligated to) withhold a periodic or final payment in an amount reasonably necessary to cover the amount which is not current until the Owner receives reasonable proof from the Contractor that Contractor has, in fact, become current.

9.6.2 Delete the phrase: "no later than seven days" from the first sentence.

After the end of the second sentence, add the following:

La R.S. 9:2784 (A) and (C) require a Contractor or Subcontractor to make payment due to each Subcontractor and supplier within fourteen (14) consecutive days of the receipt of payment from the Owner. If not paid, a penalty in the amount of ½ of 1% per day is due, up to a maximum of 15% from the expiration date until paid. The contractor or subcontractor, whichever is applicable, is solely responsible for payment of a penalty.

9.6.4 add the following to the end of the Section 9.6.4:

Owner is not obligated to monitor payments to Subcontractors or Sub-subcontractors, and nothing in this Article 9 shall create any right on the part of a Subcontractor or Sub-subcontractor against Owner or Architect.

Pursuant to La. R.S. 38:2242 and La. R.S. 38:2242.2, when the Owner receives any claim of nonpayment arising out of the Contract, the Owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the recorder of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

Delete Section **9.7 FAILURE OF PAYMENT**.

Delete Section 9.8 and substitute the following:

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Section.

In general, the only remaining Work shall be minor in nature, so that the Owner may occupy the Project on that date and the completion of the Work by the Contractor will not materially interfere or hamper the Owner's normal business operations or create an unsafe condition or fail to satisfy a governing entity. The punchlist shall be completed within 10 consecutive calendar days or as agreed upon following the Substantial Completion Date ("Final Completion"). Notwithstanding the foregoing or anything to the contrary contained in the Contract Documents, Owner may refuse to make payment on any Certificate of Substantial Completion or any other Certificate of Payment by Architect for any material default by Contractor under the Contract Documents (including but not limited to the reasons set out in Paragraph 9.5.1) and Owner shall not be deemed to be in default under the Contract Documents for its withholding such payment. (La. R.S. 38: 2248(B))

9.8.2 When the Contractor considers that the Work 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 shall make an inspection to determine whether the Work is substantially complete. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office. If the Architect'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 for its intended use, the Contractor shall, before the Work can be considered as Substantially Complete, 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.

9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a punch list of exceptions and the dollar value related thereto. The punch list shall be furnished to the Contractor within 10 days of Substantial Completion. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of Work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the forty-five day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be considered as substantially complete. If funds remaining are less than that required to complete the Work, the Contractor shall pay the difference.

9.8.5 When the preparation of the punch list is complete the Architect shall prepare a recommendation of Substantial Completion incorporating the punch list and submit it to the Owner. Upon approval of the Substantial Completion, the Owner may issue a Certificate of Substantial Completion which shall establish the Date of Substantial Completion. The Owner shall record the Certificate of Substantial Completion with the Clerk of Court in Caddo Parish. All additive change orders must be processed before

issuance of the Certificate of Substantial Completion The Owner shall not be responsible for payment for any Work associated with change orders that is not incorporated into the contract at the time of the Certificate of Substantial Completion.

9.8.6 Warranties required by the Contract Documents shall commence on the date of Acceptance of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If delivery of material and equipment included on the punch list is beyond the control of the Contractor and requires additional time, then the Contractor's completion time shall be extended and his surety so notified. If the Owner finds the Contractor is in default, the Surety shall be notified. If the Owner finds the Contractor in default, the Owner may, at his option, contract to have the balance of the Work completed and pay for such Work with the unpaid funds remaining in the Contract sum. Failure to complete the punch list will place the Contractor in default and he may be disqualified from bidding on future Caddo Parish School Board contracts.

9.9 PARTIAL OCCUPANCY OR USE

Delete Section 9.9.1 and substitute the following:

9.9.1 Partial Occupancy is that stage in the progress of the Work when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the designated portion of the Work for its intended use. The Owner may occupy or use any substantially completed portion of the Work so designated by separate agreement with the Contractor and authorized by public authorities having jurisdiction over the Work. Such occupancy or use may commence provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, 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 the designated 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.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.2 (Item 6 of this paragraph is revised as follows):

The Owner shall within a reasonable time, record the acceptance with the Clerk of Court of Caddo Parish. By copy of the Letter of Transmittal to the Clerk of Court, the Contractor shall be notified. The Contractor shall furnish a clear lien certificate.

Delete Section 9.10.4 and replace with the following:

9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner for the following:

9.10.4.1 Claims, security interests, or encumbrances arising out of the Contract and unsettled;

9.10.4.2 failure of the Work to comply with the requirements of the Contract Documents irrespective of when such failure is discovered;

9.10.4.3 terms of special warranties required by the Contract Documents;

9.10.4.4 audits performed by the Owner, after final payment;

9.10.4.5 Tortious Act; and

9.10.4.6 Actions on account of defects in the Work.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2 In the first sentence, between the words: "bearing on" and "safety", add the words: "the health and,"

10.3 HAZARDOUS MATERIALS

10.3.2 After the first sentence, delete all remaining sentences.

Add at the end: "The Contract time shall be extended appropriately."

Delete 10.3.3 in its entirety.

Modify 10.3.4 to read: The Owner shall not be responsible for materials and substances brought to the site by the Contractor.

Delete 10.3.6 in its entirety.

Delete Section 10.4 and substitute the following:

10.4 EMERGENCIES

In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 15 and Article 7.

ARTICLE 11
INSURANCE AND BONDS

AIA A101 – 2017 Exhibit A is not a part of these documents. Delete all of Sections 11.1, 11.2, 11.3, 11.4, and 11.5, and substitute the following:

INSURANCE REQUIREMENTS FOR NEW CONSTRUCTION, ADDITIONS AND RENOVATIONS

11.1 CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall purchase and maintain without interruption for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. The duration of the contract shall be from the inception of the contract until the date of final payment.

11.1.1 The Contractor shall submit with the signed contract a certificate of insurance that correlates directly with the insurance requirements stipulated by the Caddo Parish School Board. The Contractor also shall submit to Owner evidence from Contractor's insurer that Caddo Parish School Baord has been placed as an additional insured on Contractor's relevant policy(ies) of insurance. The "certificate of insurance", alone, will not suffice as such evidence. All insurance shall be placed in a company admitted to do business in the State of Louisiana and having a current A.M.Best rating of A: VI or better.

11.1.2 The Contractor shall not commence work under this contract until he has obtained all insurance required by this paragraph , and until such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until identical insurance has been obtained and evidence of such submitted in the form of a certificate of insurance. All certificates of insurance must contain a provision that no cancellation or change in such insurance shall be effected without thirty (30) days written notice first being given to the Owner.

If at any time, any of the insurance polices required to be furnished by the Contractor under the terms of this article shall lapse, expire, or fail to comply with the requirements of this article the Contractor shall procure and obtain such new insurance policies as may be required to comply with the requirements of this article. Upon obtaining a new insurance policy, the Contractor shall submit a new certificate of insurance to the Owner for approval. Upon failure of the Contractor to furnish, deliver and maintain such insurance as required by this article, the contract, at the discretion of the Owner, may be declared suspended, discontinued or terminated. Failure of the Contractor to maintain any required insurance shall not relieve the Contractor from any liability under the contract, nor shall the insurance requirements contained in this article be construed to conflict with obligations of the Contractor regarding indemnification as set forth.

The requirements contained in this article shall not be construed and are not intended to limit the Contractor's obligations to indemnify and defend the Caddo Parish School Board, but merely constitute minimum insurance requirements which must be provided to secure such obligations.

The Contractor shall obtain and maintain for the full period of the contract the following types of insurance in the form, minimum limits and amounts herein specified or as may otherwise be required in the contract documents. The Contractor shall automatically renew

any policy that expires during the performance of the contract and notify the Owner of such renewal prior to the expiration date.

11.1.2.1 The insurance required by subparagraph 11.1.1 shall be written for not less than the following, or greater if required by law:

11.2 MINIMUM SCOPE AND LIMITS OF INSURANCE

11.2.1 WORKER'S COMPENSATION

Workers Compensation and Employers Liability insurance, in accordance with all applicable state and federal laws.

Workers Compensation	Statutory
Employers Liability	$100,000

Policy to include a Waiver of Subrogation endorsement in favor of the Caddo Parish School Board.

11.2.2 COMMERCIAL GENERAL LIABILITY

Commercial General Liability insurance, including Personal and Advertising Injury Liability and Products and Completed Operations Liability, shall have a minimum limit per occurrence based on the project value. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

The aggregate loss limit must apply to <u>each project</u>. ISO form CG 25 03 (current form approved for use in Louisiana), or equivalent, shall also be submitted. The Caddo Parish School Board project number, including part number, and project name shall be included on this endorsement.

COMBINED SINGLE LIMIT (CSL) PER OCCURRENCE

$1,000,000 each occurrence
$2,000,000 aggregate
Coverage to include:

Premises/Operations
Products/Completed Operations
Contractual Liability
Independent Contractors
Explosion, Collapse, Underground

Aggregate Limits per Project (CG2503) or an equivalent endorsement

Waiver of Subrogation in favor of Caddo Parish School Board

Additional Insured endorsement naming Caddo Parish School Board as additional insured.

If policy contains a deductible or Self Insured Retention, this must be indicated on the attached certificate of insurance.

11.2.3 AUTOMOBILE LIABILITY

Automobile Liability Insurance shall have a minimum combined single limit per occurrence of $1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired and non-owned automobiles as follows:

$1,000,000 per occurrence

Coverage to include:

All owned autos
Hired autos
Non-owned autos
Waiver of Subrogation in favor of Caddo Parish School Board
Additional Insured endorsement naming Caddo Parish School Board as additional insured.
MCS-90 endorsement (where applicable)

Bodily Injury - Each Person	250,000
Bodily Injury - Each Occurrence	500,000
Property Damage - Each. Occurrence	100,000

If policy contains a deductible or Self Insured Retention, this must be indicated on the attached certificate of insurance.

11.2.4 EXCESS UMBRELLA

The Contractor shall procure and maintain during the life of the Contract on Project an Umbrella Insurance Policy in excess of all other Insurance requirements.

$1,000,000 each occurrence

11.2.5 OWNERS AND CONTRACTORS PROTECTIVE LIABILITY issued in the name of the Caddo Parish School Board.

$1,000,000 each occurrence
$2,000,000 aggregate

11.2.6 BUILDER'S RISK

11.2.6.1 The Contractor, before commencement of the work, shall effect and maintain Builders Risk insurance for the life of the contract. Coverage shall be on an "All Risk" form, including flood if the project is located in a flood prone area, and shall include fees and charges of architects, engineers, attorneys, and other professionals resulting from any insured loss or incurred in the repair or replacement of any insured property. Policy shall be written in an amount equal to the full insurable value of all portions of the project that are subject to a loss for which "All Risk" Builders Risk coverage gives protection. Where applicable, policy shall cover property in transit and while stored at a location other than the job site, when such portions of the work are to be included in an application for payment.

Policy shall include Caddo Parish School Board as a Named Insured.

Policy shall be written with a maximum deductible of $5,000. Contractor agrees he is responsible for all losses incurred within the deductible amount.

A certified copy of the policy shall be furnished to the Owner as evidence of the required coverage.

The policy shall provide coverage equivalent to the ISO form number CP 10 20, Broad Form Causes of Loss (extended, if necessary, to include the perils of wind, earthquake, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure).

11.2.7 PROPERTY DAMAGE

(Broad form Property Damage) to include Products and Completed Operations and Contractual Liability

Each Occurrence	250,000
Aggregate	500,000

11.2.8 BODILY INJURY

(Aggregate Limits) (including Products and Competed Operations and Contractua Liability)

Each Person	500,000
General Aggregate	1,000,000

11.2.9 XCU COVERAGE

Remove exclusion.

11.2.10 PRODUCTS AND COMPLETED OPERATIONS

To be maintained for one year after final payment.

11.2.11 Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and accepted by the Owner. The Contractor shall be responsible for all deductibles and self-insured retentions.

11.3 PAYMENT AND PERFORMANCE BOND

Refer to Article 7 of "Instructions to Bidders" for Payment and Performance Bond requirements. The surety (ies) shall be authorized and licensed to do business in the State of Louisiana in accordance with La. R.S. 38:2219, et. seq.

Recordation of Contract and Bond [La R.S. 38:2241 thru 38:2241.1] The Owner shall record within thirty (30) days the Contract Between Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the Parish in which the Work is to be performed.

11.4 OTHER INSURANCE PROVISIONS

11.4.1 The policies are to contain, or be endorsed to contain, the following provisions:

11.4.1.1 Worker's Compensation and Employers Liability Coverage

11.4.1.1.1 To the fullest allowed by law, the insurer shall agree to waive all rights of subrogation against the Owner, its officers, agents, employees and volunteers for losses arising from Work performed by the Contractor for the Owner.

11.4.1.2 Commercial General Liability Coverage

11.4.1.2.1 The Owner, its officers, agents, employees and volunteers are to be added as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. ISO Form CG 20 10 (for ongoing work) AND CG 20 37 (for completed work) (current forms approved for use in Louisiana), or equivalent, are to be used.

11.4.1.2.2 The Contractor's insurance shall be primary as respects the Owner, its officers, agents, employees and volunteers for any and all losses that occur under the contract. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. Any insurance or self-insurance maintained by the Owner shall be excess and non-contributory of the Contractor's insurance.

11.4.1.3 Builder's Risk

The policy must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy, which may also be covered by a State of Louisiana self-insurance, Contractor and its insurer agree to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, the Contractor's insurer and the Caddo Parish School Board <u>each</u> select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers shall select a competent and impartial umpire. The appraisers shall then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company agrees that the decision of the appraisers and the umpire if involved shall be binding and final and that neither party will resort to litigation. Each of

the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

11.4.1.4 All Coverages

11.4.1.4.1 All policies must be endorsed to require 30 days written notice of cancellation to the Owner. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy. In addition, Contractor is required to notify Agency of policy cancellations or reductions in limits.

11.4.1.4.2 Neither the acceptance of the completed Work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.

11.4.1.4.3 The insurance companies issuing the policies shall have no recourse against the Owner for payment of premiums or for assessments under any form of the policies.

11.4.1.4.4 Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, agents, employees and volunteers.

11.4.3 Verification of Coverage

Contractor shall furnish the Owner with Certificates of Insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to be received and approved by the Owner before Work commences and upon any contract renewal or insurance policy renewal thereafter.

The Certificate Holder must be listed as follows:

Caddo Parish School Board
Capital Construction Office
1961 Midway Ave.
Shreveport, LA 71108
Attn: Project # _____

The Owner reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain required insurance, this contract, at the election of the Agency, may be suspended, discontinued, or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

If the Contractor does not meet the insurance requirements at policy renewal, at the option of the Owner, payment to the Contractor may be withheld until the requirements have been met, OR the

Owner may pay the renewal premium and withhold such payment from any monies due the Contractor, OR the contract may be suspended or terminated for cause.

11.4.4 Subcontractors

Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Owner reserves the right to request copies of subcontractor's certificates at any time.

If Contractor does not verify subcontractors' insurance as described above, Owner has the right to withhold payments to the Contractor until the requirements have been met.

11.4.5 Worker's Compensation Indemnity

In the event Contractor is not required to provide or elects not to provide Worker's compensation coverage, the parties hereby agree the Contractor, its Owners, agents and employees shall have no cause of action against, and shall not assert a claim against, the Caddo Parish School Board, its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Worker's Compensation Act or otherwise, under any circumstance. The parties also hereby agree that Caddo Parish School Board, its departments, agencies, officers, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its Owners, agents and employees. The parties further agree that Contractor is a wholly independent Contractor and is exclusively responsible for its employees, Owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the Caddo Parish School Board, its departments, agencies, officers, agents and employees harmless from any such assertion or claim that may arise from the performance of this contract.

11.3.6 Indemnification/Hold Harmless Agreement

Contractor agrees to protect, defend, indemnify, save, and hold harmless, the Caddo Parish School Board, its officers, agents, servants, employees and volunteers, from and against any and all claims, damages, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims, demands, suits or causes of action arising out of the negligence of the Caddo Parish School Board, all its Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent. The Caddo Parish School Board may, but is not required to, consult with the Contractor in the defense of claims, but this shall not affect the Contractor's responsibility for the handling and expenses of all claims.

ARTICLE 12
UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

12.2.1 Before Substantial Completion

At the end of the paragraph, add the following sentences:
"If the Contractor fails to correct Work identified as defective within a fifteen (15) day period, through no fault of the Designer, the Owner may hold the Contractor in default. If the Owner finds the Contractor in default, the Surety shall be notified. If within fifteen (15) days after notification, the Surety has not corrected the nonconforming Work, through no fault of the Architect or Owner, the Owner may contract to have nonconforming Work corrected and hold the Surety and Contractor responsible for the cost, including architectural fees and other indirect costs. If the Surety fails to correct the Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may elect not to accept bonds submitted in the future by the Surety. Finding the Contractor in default shall constitute a basis for disqualification of the Contractor from bidding on future Caddo Parish School Board contracts.

12.2.2 After Substantial Completion

12.2.2.1 At the end of the paragraph delete the last sentence and add the following sentences:
"If the Contractor fails to correct nonconforming Work, or Work covered by warranties, within a thirty (30) day period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the non-conforming or warranty Work, through no fault of the Architect or Owner, the Owner may contract to have the nonconforming or warranty Work corrected and hold the Surety responsible for the cost including architect's fees and other indirect costs. Corrections by the Owner shall be in accordance with Section 2.4. If the Surety fails to correct the nonconforming or warranty Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may not accept bonds submitted, in the future, by the Surety."

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Delete all after the word "located".

13.2 SUCCESSORS AND ASSIGNS

13.2.1 In the second sentence, delete "Except as … 13.2.2"

Delete Section 13.2.2.

13.3 RIGHTS AND REMEDIES

Add the following Section 13.3.3:

13.3.3 The First Judicial Court in and for the Parish of Caddo, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.4 TESTS AND INSPECTIONS

In Section 13.4.1, delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals only in the event that the work meets minimum specifications.

Delete the last two sentences of Section 13.4.1.

13.5 INTEREST

Delete Section 13.5.

ADD: 13.8 SMOKING

13.8 Use of all tobacco products and vaping are prohibited on all Caddo Parish School Board Property.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete Section 14.1.1.4.

In Section 14.1.3, after the word "profit," delete the words "on Work not executed" and substitute the following: "for Work completed prior to stoppage".

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following at the end of 14.2.1:

14.2.1 :

.5 Contractor becomes insolvent, or makes a transfer in fraud of creditors, or makes an assignment for the benefit of creditors;

.6 Contractor files or has filed against it a petition under any chapter or section of the United States Bankruptcy Code, as amended, or under any similar law or statute of the United States or any state thereof, or shall be adjudged bankrupt or insolvent in any legal proceeding;

.7 a receiver or trustee is appointed for all or a significant portion of the assets of Contractor; or

.8 Contractor actually or constructively abandons, or puts Owner on actual or constructive notice that it intends to abandon, the Project.

.9 failure to complete the punch list within the lien period as provided in 9.8.7.

14.2.2 Delete the words "upon certification by the Architect that sufficient cause exists tojustify such action" and delete the words "subject to any prior rights of the surety" and add the following:

After any termination of this Contract by Owner pursuant to this Subparagraph 14.2.2, Contractor shall not be entitled to any further payment except to the extent of any amount by which Work completed or installed by Contractor prior to such termination and not previously paid for by Owner exceeds the amount due by Contractor to Owner under this Paragraph 14.2.2 (including all damages which Owner would be entitled to recover at law from Contractor by reason of Contractor's breach, subject to the waiver of consequential damages set out herein), and even then only at such time as the Work is finally completed. It is expressly agreed that pursuit by Owner of any one or more of the remedies provided herein or otherwise available at law or in equity shall not constitute an election of remedies by Owner, nor shall forbearance by Owner to enforce one or more of the remedies provided herein upon an event of default by Contractor be deemed or construed to constitute a waiver of such default.

14.2.3 Add the following sentence:

"Termination by the Owner shall not suspend assessment of liquidated damages against the Surety."

Add the following Section:

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article shall not relieve the Contractor and/or Surety of his obligations under the liquidated damages provisions and the Contractor and/or Surety shall be liable to the Owner for per diem liquidated damages.

It is recognized that: (1) if an order for relief is entered on behalf of Contractor pursuant to Title 11 of the United States Bankruptcy Code, (2) if any other similar order is entered under any other debtor relief laws, (3) if Contractor makes a general assignment for the benefit of its creditors, (4) if a receiver is appointed for the benefit of its creditors, or (5) if a receiver is appointed on account of its insolvency, any such event could impair or frustrate Contractor's performance of the Contract Documents. Accordingly, it is agreed that upon the occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest adequate and sufficient assurance of future performance in accordance with the terms and conditions of the Contract Documents. Failure to comply with such request within ten (10) days of delivery of the request shall entitle Owner to terminate the Contract Documents and to the accompanying rights set forth above in Subparagraphs 14.2.1 through 14.2.4 hereof. In all events pending receipt of adequate and sufficient assurance of performance and actual performance in accordance therewith, Owner shall be entitled to proceed with the Work with its own forces or with other contractors on a time and material or other appropriate basis, the cost of which will be backcharged to the Contractor.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

In Section 14.4.3, delete all after "incurred by reason of the termination, including costs attributable to termination of Subcontracts"" and add "along with reasonable anticipated profit on the Work not executed."

ARTICLE 15
CLAIMS AND DISPUTES

15.1 CLAIMS

Delete Section 15.1.2, **Time Limit on Claims,** (See La R.S. 38:2189, and 38:2189.1).

15.1.3.1 Add the following to the end of the paragraph:
"A Reservation of Rights and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided."

Delete subparagraph 15.1.4 and substitute therefor:

15.1.4.1 Continuing Contract Performance. After receipt of a Notice of Claim, the Owner may elect to refer the matter to the Architect or another party for review. Contractor will attend meetings called to review and discuss the Claims and mitigation of the problem and shall furnish any reasonable factual backup for the Claim requested. At any stage, the Owner is entitled to refer a Claim to mediation under the Construction Industry Mediation Rules of the American Arbitration Association, and if this reference is made, Contractor will take part in the mediation process. The filing, mediation or rejection of a Claim does not entitle Contractor to stop performance of the Work. The Contractor shall proceed diligently with performance of the Contract.

Delete 15.1.6.2 and add in its place:

15.1.6.2 If unusual inclement weather conditions are the basis of the claims, unusual inclement weather as used herein means unusually severe weather that is beyond the normal weather recorded and expected for Caddo Parish and/or the season or seasons of the year. Normal weather shall be determined based on records for the station of the United States Environmental Data Service as reproduced hereafter in Paragraph 15.1.5.3.

If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction. An increase in the contract time due to weather shall not be cause for an increase in the contract sum. At the end of each month, the Contractor shall make one Claim for any adverse weather days occurring within the month. The Claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction. Failure to make such Claim within **twenty-one (21) days** from the last day of the month shall prohibit any future claims for adverse days for that month. No additional adverse weather days shall be granted after the original or extended contract completion date, except those adverse weather days associated with a National Weather Service named storm or federally declared weather related disaster directly affecting the project site

15.1.6.3 Weather Conditions -- Information in tables below was compiled from the records for the National Weather Service Station at Shreveport, Louisiana.

PRECIPITATION

Monthly Number of Days Precipitation

> = .03 for Shreveport Area

2005 - 2015

Month	Maximum Rain Days	Minimum Rain Days	Average No Days >=.03
January	11	4	8
February	10	5	8
March	12	3	7
April	13	4	7
May	15	3	8
June	13	3	7
July	15	2	7
August	13	1	5
September	10	1	5
October	13	2	6
November	11	3	6
December	11	4	8

Rain days will be granted on a 1 for 1 basis for number of days reported of >=.03" of rain over the monthly average.

Example:

Days of rain >=.03 for the month of July
Dates of rain - 2, 3, 10, 12, 13, 16, 17, 22 =

8	days
7	July average
1	days granted

Claims for extensions of time due to inclement weather must be supported by copies of the Contractor's daily reports.

15.1.7 Waiver of Claims for Consequential Damages – Delete and substitute therefor:

Except as otherwise provided in this Agreement, in calculating the amount of any Claim, the following standards will apply:

.1 No indirect or consequential damages will be allowed.

.2 No recovery shall be based on a comparison of planned expenditures to total actual expenditures, or on estimated losses of labor efficiency, or on a comparison of

planned manloading to actual manloading, or any other analysis that is used to show damages indirectly.

.3 Damages are limited to extra costs specifically shown to have been directly caused by a proven wrong.

.4 The maximum daily limit on any recovery for delay shall be the amount originally estimated by the Contractor for job overhead costs divided by the total number of calendar days of Contract Time called for in the original Contract.

.5 No damages will be allowed for home office overhead or other home office charges or any Eichleay formula calculation.

.6 Reasonable profit will be allowed on any damage claim.

15.2 INITIAL DECISION

15.2.1 In the second sentence, delete the word "will" and replace with: "shall always".

In the second sentence, delete the phrase: ", unless otherwise indicated in the Agreement."

In the third sentence, delete the word "mediation" and replace with: "litigation".

At the end of the third sentence, add: "arising prior to the date final payment is due".

Delete the fourth sentence.

15.2.5

In the third sentence, delete all after: "binding on the parties" and add the following: "except that the Owner may reject the decision or suggest a compromise or both".

Delete Section 15.2.6.

Delete Section 15.2.6.1.

15.3 MEDIATION

Delete Section 15.3 in its entirety.

15.4 ARBITRATION

Delete Section 15.4 in its entirety.
If there is any reference to arbitration in the printed form of the General Conditions or in any document related to the project of which these General Conditions are part of the Contract Documents, then the term shall be construed as not written and shall be disregarded.

Add:

15.8 If either party places the enforcement of this Agreement, or any part hereof, or the exercise of any remedy herein provided, in the hands of an attorney who institutes an action or proceeding upon

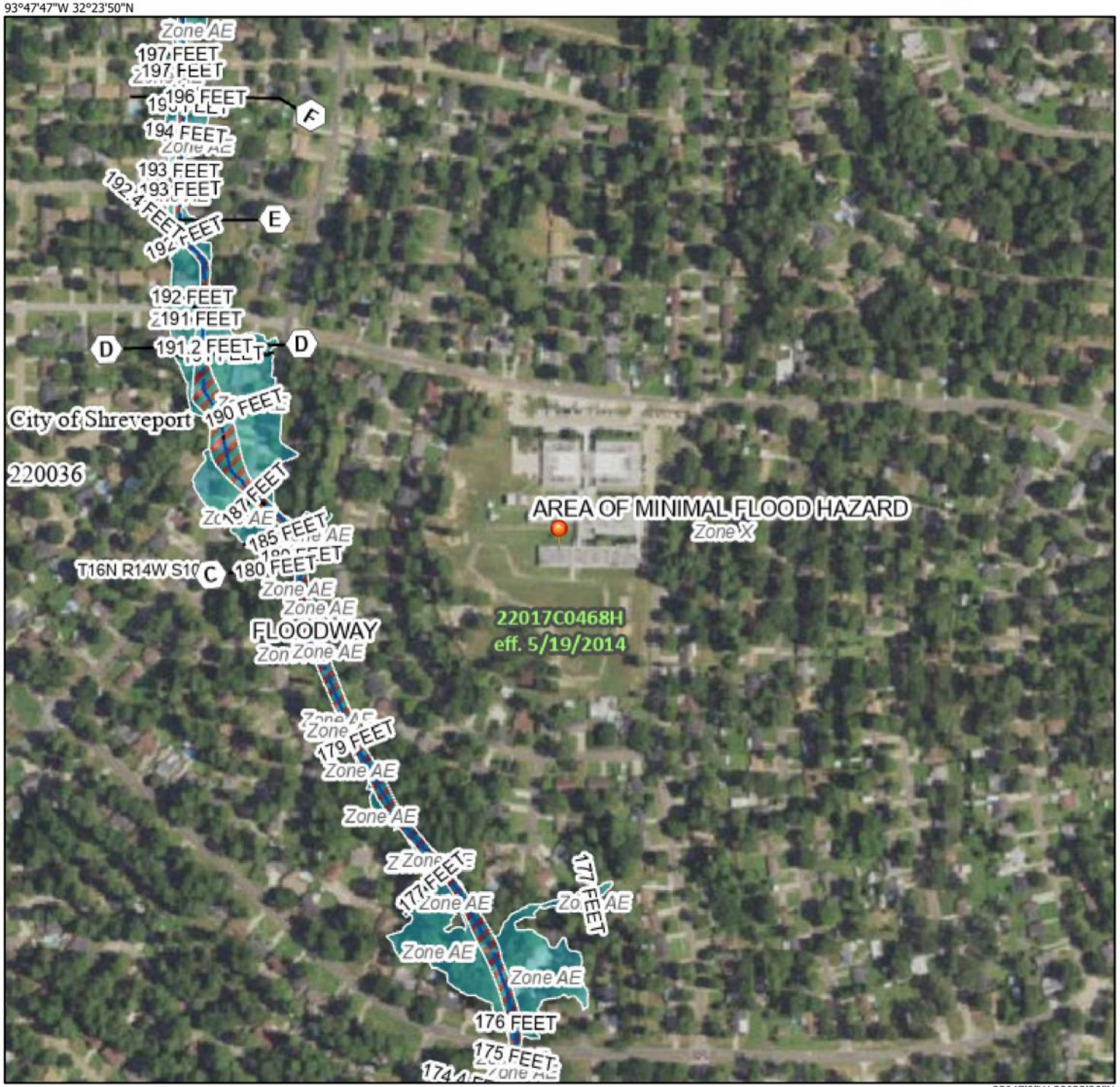
the same (either by direct action or counterclaim), the non-prevailing party shall pay to the prevailing party its reasonable attorneys' fees and costs of court. In addition to the foregoing award of attorneys' fees to the prevailing party, the prevailing party shall be entitled to its attorneys' fees incurred in any post-judgment proceeding or action to collect or enforce the judgment. This provision is separate and several and shall survive the expiration or earlier termination of this Agreement or the merger of this Agreement into any judgment on such instrument.

END OF DOCUMENT

National Flood Hazard Layer FIRMette

FEMA

93°47'47"W 32°23'50"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

93°47'9"W 32°23'20"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/7/2026 at 10:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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CADDO PARISH SCHOOL BOARD
FOREST HILL ELEMENTARY SCHOOL
HVAC UPGRADE
2005 FRANCAIS DRIVE
SHREVEPORT, LOUISIANA 71118
PROJECT NO. 2027-752
AFJMC #25-171

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CADDO PARISH SCHOOL BOARD
FOREST HILL ELEMENTARY SCHOOL
HVAC UPGRADE
2005 FRANCAIS DRIVE
SHREVEPORT, LOUISIANA 71118
PROJECT NO. 2027-752
AFJMC #25-171

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SECTION 01 01 0 - SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 PROJECT/WORK IDENTIFICATION

A. General: Project name is ***"FOREST HILL ELEMENTARY SCHOOL HVAC UPGRADE, CPSB PROJECT NO. 2027-752"*** as shown on Contract Documents prepared by Aillet, Fenner, Jolly & McClelland, Inc. Drawings and Specifications are dated December 31, 2025**.**

B. Summary by References: Work of the contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, addenda and modifications to the contract documents issued as part of addenda subsequent to the initial printing of this project manual and including, but not necessarily limited to, printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon, including weather conditions, and other forces outside the contract documents.

C. Abbreviated Written Summary: Briefly and without force and effect upon the contract documents, the work of the Contract can be summarized as follows:

1. The work includes removal of split-system heat pumps and air handling units, packaged air conditioning units, duct work, piping and electrical. The project includes installation of new split-system heat pumps and air units, packaged air conditioning units, duct work, piping, and all associated architectural, electrical and structural work.

D. Sequence of Work: Sequence work for minimum interruption of the Owner's operation. Cooling outages shall be limited to times when the outdoor temperature is less than 55 degrees F or when the facility is not in use. Electrical outages must be limited to the hours of 12 midnight to 6 A.M., must be for a minimum time, and must be approved in advance by the Owner, including holidays, if necessary.

E. Utility Interruptions: Utility interruptions shall be held to a minimum and will be permitted only at times approved by the Owner. The Owner may require that any outages be during nights, weekends, holidays, etc. Provide any required overtime work at no additional cost to the Owner.

F. Completion Date: As required by Instructions to Bidders, the Contractor is required to fully complete construction of project within specified number of days. Contractor shall furnish sufficient forces, construction material and equipment, and work such hours, including weekend and night shifts as may be necessary to ensure that completion of project occurs by the contractual completion date. If, in the opinion of the Architect and Owner, Contractor falls behind progress schedule, Contractor shall take steps as may be necessary to improve his progress by such means as increasing number of men, number of shifts, days of work, and/or

amount of construction plant, all without additional cost to Owner. If access to building is required at other than normal building hours, Contractor shall make arrangements with Owner.

1.3 CONTRACTOR USE OF PREMISES

A. General: The Contractor shall limit his use of the premises to the work indicated, so as to allow for Owner occupancy with minimum interruptions.

B. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

C. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials.

D. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas approved by Owner. If additional storage is necessary, obtain and pay for such storage off-site. The Owner will not make payments for materials stored off-site unless they are stored in a licensed, bonded and insured warehouse facility.

E. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

F. Use of existing toilets within the buildings by the Contractor and his personnel or sub-contractors will **not** be permitted. **The Contractor shall provide portable toilet facilities. The toilet shall be located where directed by the school principal and shall remain locked when not in use.**

G. The Caddo Parish School Board will remove computer equipment and Teacher property from work areas. The contractor shall tag and move all remaining furniture and other items from work areas as required to complete the project. At project closeout the contractor shall move all items back to their original location. Contractor shall not be required to move computer equipment and/or Teacher property back to their original location.

H. All existing plumbing fixtures, including floor drains, shall be protected from demolition and construction debris. At project closeout all fixture drains shall be cleaned and restored to proper operation. In addition all plumbing vents receiving A/C condensate shall be cleaned and restored to proper operation.

I. Remove all demolition debris from work areas daily and sweep broom clean. Place refuse in contractor's dumpster.

J. Remove all packaging (boxes, pallets, plastic wrap etc.) from new equipment and materials and place in contractor provided dumpster or remove from site daily.

K. The Owner and/or Architect/Engineer will visit the site weekly. The Owner and/or Architect/Engineer will notify the contractor, by a warning, in writing, of any areas not in

compliance with the requirements for a clean construction site. The owner reserves the right to obtain the services of cleaning contractors, whose cost of services **shall** be deducted from the contract amount in the event the contractor does not comply with Owner/Architect/Engineer's warnings.

L. General Requirements: Observe no smoking/tobacco rules. All personnel must wear shirts.

M. Asbestos: No asbestos-containing materials have been identified on items that are indicated to be disturbed. If asbestos-containing materials are encountered, comply with the following:

1. Upon encountering any previously unidentified materials which he suspects may contain asbestos, the Contractor shall immediately cease all work in the immediate vicinity of the suspected materials and notify the Designer and the Owner. The Owner shall retain consultants to identify the suspected materials. Upon identification, the Owner reserves the right to contract separately for the removal, or require the Contractor to remove said materials in accordance with the following provision. In any case, the work shall be performed by a licensed and certified Abatement Contractor.
2. The Louisiana Department of Environmental Quality (D.E.Q.) has issued the Louisiana Emission Standards for Hazardous Air Pollutants. Where asbestos is encountered in a project, the Contractor shall comply with all laws and ordinances pertaining to asbestos handling and abatement, including the latest revision of LAC 33:111, Chapter 25, Subchapter F, Emission Standards for Hazardous Air Pollutants, LAC 33:111, Chapter 27, Asbestos Containing Materials in Schools and Public Buildings and LAC 33:111, Chapter 51, Subchapter M, Section 5151, Emission Standards for Asbestos.
3. Notification should be addressed to:

   Asbestos Coordinator
   Louisiana Department of Environmental Quality
   Air Quality Division
   Post Office Box 82135
   Baton Rouge, Louisiana 70884-2135

4. If the Owner chooses to remove any previously unidentified materials by utilizing different Contractors, the Contractor shall cooperate fully with the Owner's consultants and asbestos abatement Contractor permitting them full access to the project, and shall not resume work in the vicinity of the suspected materials until advised by the Designer and the Owner that it is safe to do so.
5. Refer to Article 7 of the Supplementary Conditions if the Contractor is required to do this work.

1.4 OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner will occupy the site during the entire period of construction. Cooperate fully with the Owner and his representative during construction operations to minimize conflicts and to facilitate Owner usage. Perform the work so as not to interfere with the Owner's operations.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01010

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 15 and Division 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

C. Demolition of selected portions of the building for alterations is included in Division 1 Section 01732, "Selective Demolition."

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform Work.
4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

1. Foundation construction.
2. Bearing and retaining wall.
3. Structural concrete.
4. Structural steel.
5. Lintels.
6. Timber and primary wood framing.
7. Structural decking.
8. Stair systems.
9. Miscellaneous structural metals.
10. Exterior curtain wall construction.
11. Equipment supports.
12. Piping, ductwork, vessels and equipment.
13. Structural systems of special construction in Division 11 Sections.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

a. Shoring, bracing, and sheeting.
b. Primary operational systems and equipment.
c. Air or smoke barriers.
d. Water, moisture, or vapor barriers.
e. Membranes and flashings.
f. Fire protection systems.
g. Noise and vibration control elements and systems.
h. Control systems.
i. Communication systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Special construction specified by Division 13 Sections.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine such as carborundum saw or diamond core drill.
4. Comply with requirements of applicable Sections of Division-1 where cutting and patching requires excavating and backfilling.
5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

    a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01090 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF REQUIREMENTS

A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the work. These requirements include obtaining permits, licenses, inspections, releases, and similar documentation, as well as payments, statements, and similar requirements associated with regulations, codes, and standards.

B. The term "Regulations" is defined to include laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

1.3 DEFINITIONS

A. General Explanation: Certain terms used in Contract Documents are defined in this Article. Definitions and explanations contained in this Section are not necessarily complete, but are general for the work to extent that they are not stated more explicitly in another element of the Contract Documents.

B. General Requirements: Provisions and requirements of other Division 1 Sections apply to the entire work of the Contract and, where so indicated, to other elements which are included in the project.

C. Indicated: The term "indicated" is a cross-reference to graphic representations, notes, or Schedules on the Drawings, to other paragraphs or Schedules in the Specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate the cross-reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Architect," "requested by the Architect," and similar phrases. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

E. Approve: Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the term "approved" will be held to limitations of the Architect's responsibilities and duties as specified in General and Supplementary Conditions. In no case will the Architect's approval be interpreted as a release

of the Contractor from responsibilities to fulfill requirements of Contract Documents or acceptance of the work, unless otherwise provided by requirements of the Contract Documents.

F. Project Site: The term "project site" means 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. The extent of the project site is shown on the Drawings, and may or may not be identical with the description of the land upon which the project is to be built.

G. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

H. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning, and similar operations."

I. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

J. Installer: The "installer" is "the entity" (person or firm) engaged by the Contractor, its subcontractor, or sub-subcontractor for performance of a particular element of construction at the project site, including installation, erection, application, and similar required operations. It is a requirement that installers are experienced in the operations they are engaged to perform.

K. Testing Laboratory: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Except where more explicit or stringent requirements are written into the Contract Documents, applicable construction standards have the same force and effect as if bound into or copied directly into the Contract Documents. Such industry standards are made a part of the Contract Documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at the project site for reference.

B. Referenced standards (standards referenced directly in the Contract Documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the work.

C. Unreferenced Standards: Except as otherwise limited by the Contract Documents, standards not referenced but recognized in the construction industry as having direct applicability will be enforced for performance of the work. The decision as to whether an industry code or standard is applicable, or as to which of several standards are applicable, is the sole responsibility of the Architect.

D. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.

E. Conflicting Requirements: Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or

quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect for a decision before proceeding.

F. Minimum Quantities or Quality Levels: In every instance, the quantity or quality level shown or specified is intended to be the minimum to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are minimum or maximum values, as noted, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Architect for decision before proceeding.

G. Copies of Standards: The Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.

H. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.

I. Although copies of standards needed for enforcement of requirements may be required submittals, the Architect reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

J. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in specifications or other Contract Documents they are defined to mean the recognized name of the trade association, standards generating organization, governing authority or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Company, available in most libraries.

1.5 SUBMITTALS

A. Permits, Licenses, and Certifications: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work. Local Building Permits are not required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01090

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 RELATED SECTIONS

A. Construction Schedule: Division 1 Section 01300, "Submittals."

1.3 PRE-CONSTRUCTION MEETING

A. After notification that the contract has been executed, the Engineer shall arrange with the Owner, User Agency, and Contractor, and conduct a pre-construction conference to be held at the project site. The Contractor shall be responsible to see that his Project Foreman and subcontractors are in attendance, and shall furnish the following to the Architect, Owner, and User Agency:

1. Schedule of values (Division 1 Section 01300, "Submittals").
2. List of Subcontractors and major material suppliers (Division 1 Section 01300, "Submittals").
3. Construction Schedule (Division 1 Section 01300, "Submittals").
4. Waste Management Plan (Division 1 Section 01732 “Selective Demolition”

B. The following shall serve as a minimum agenda:

1. Distribute and discuss the list of major subcontractors.
2. Tentative construction schedule.
3. Critical work sequencing.
4. Use of premises.
5. Relation and coordination of major subcontractors.
6. Designation of responsible personnel.
7. Processing of field decisions and change orders.
8. Submittal of shop drawings, project data, and samples.
9. Procedures for maintaining record documents.
10. Safety and first-aid procedures.

1.4 PROGRESS MEETINGS

A. Engineer shall schedule and administer monthly progress meetings during the construction period. Required attendance shall be:

1. Engineer and his professional consultants, as needed.
2. Contractor.

3. Subcontractors, as appropriate.
4. Suppliers, as appropriate.

B. The Owner shall be notified of such meetings and may be represented. It shall be the principal purpose of these meetings or conferences to effect coordination, cooperation, and assistance in every practical way to the end of maintaining progress of the project on schedule and completing the project within the contract time.

C. Suggested Agenda:

1. Review work progress since last meeting.
2. Note field observations, problems, and decisions.
3. Review off-site fabrication problems.
4. Revise construction schedule, as indicated.
5. Review submittal schedules, expedite as required to maintain schedule.
6. Review changes proposed by Owner for effect on construction schedule and effect on completion date.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01200

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

B. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Alternate into the Project.

B. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

1. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each Alternate. Indicated if Alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to Alternates.
2. Execute accepted Alternates under the same conditions as other work of the Contract.
3. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in Schedule contain requirements for materials necessary to achieve the work described under each Alternate.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

1. Add Alternate No. 1: Provide all work associated with replacing rooftop unit RTU-K1.

END OF SECTION 01230

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Additional Submittal Requirements: Division 0 Section 00700, "General Conditions of the Contract for Construction (AIA-A201)."

B. Closeout Submittals: Division 1 Section 01700, "Project Closeout."

1.3 CONSTRUCTION SCHEDULE

A. General: As required by Article 3.10 of the General Conditions, Contractor shall, within ten days after signing the Contract, prepare and submit to Architect for information purposes, a practical schedule showing order in which Contractor proposes to carry on work, dates on which he will start salient features of work, and contemplated dates for completion. Schedule shall meet or better construction time included on Instructions to Bidders.

B. Form of Schedule: Provide in form of horizontal bar chart. Provide separate horizontal bar column for each trade or operation. Order shall be Table of Contents from Project Manual or the chronological order of beginning of each item of work. Submit three copies to Architect.

C. Content of Schedule: Provide complete sequence of construction activity, dates for beginning, and completion of each element of construction. Identify work of separate phases or other logically grouped activities. Show projected percentage of completion for each item of work as of first day of each month.

1.4 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Shop Drawings:

1. Submit prints of Original Drawings prepared by Contractor, Subcontractor, Supplier, or Distributor which illustrate same portion of work; showing fabrication, layout setting, or erection details.
2. Minor corrections needed on prints will be made by Architect; for extensive modifications, prints may be returned to Contractor for correction. When reviewed, Architect will retain two copies for record and return remaining copies to General Contractor for distribution. Reproducible copies of Shop Drawings will not be reviewed.

B. Product Data:

1. Manufacturer's Standard Drawings: Modify Drawings to delete information which is not applicable to project. Supplement standard information to provide additional information applicable to project.
2. Manufacturer's Catalog Sheet, Brochures, Diagrams: Clearly mark each copy to identify pertinent materials, product, or models. Show dimensions and clearances required. Show performance characteristics and capacities.

C. Samples:

1. Physical examples to illustrate materials, equipment, or workmanship to establish standards by which completed work is judged.
2. Office samples shall be of sufficient size and quantity to clearly illustrate functional characteristics of product or material and full range of color and texture samples.

D. General Submission Requirements:

1. Quantities: Submit the number of copies of product data and Shop Drawings that the Contractor requires for distribution, plus two copies which will be retained by the Architect. Quantity of samples required shall be as specified in Specification Section for respective product.

E. Submittals shall include:

1. Project title.
2. Names of Contractor, Subcontractor, Supplier, Manufacturer.
3. Identification of Product.
4. Relation to adjacent structure or materials.
5. Field dimensions.
6. Reference to Architect's drawing numbers, Specification Section, room numbers, structural framing marks, and/or numbers.
7. Applicable standards: e.g., ASTM.
8. Blank space for Architect's stamp.
9. Identification of deviations from Contract Documents.
10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, and compliance with Contract Documents.

F. These requirements are in addition to those in Article 3.12 of General Conditions.

1.5 SCHEDULE OF VALUES

A. General: As required by Article 9.2 of General Conditions, submit to Architect a Schedule of Values at least ten days prior to submitting first Application for Payment. Upon request by Architect, support values with data that will substantiate their correctness. Use Schedule of Values only as basis for Contractor's Application for Payment. Itemize separate line item cost for work required by each Section of this Specification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to the work of this Section.

1.2 TEMPORARY UTILITIES

A. Temporary Services: Contractor shall arrange and pay for all hook-ups, meters for all temporary utility services for construction, and, as necessary, for the proper and expeditious prosecution of the work. The Contractor shall provide piping, conduit, etc., and make all connections to existing services and sources of supply, and pay all charges for same. The Contractor shall pay for all utilities usage during the time of construction directly to the utility company. Contractor shall provide all labor, materials, equipment and appliances necessary for the complete installation, operation, and maintenance of all temporary service systems and facilities. Contractor shall remove all such temporary installations and connections when no longer required, or when directed.

B. Electric power used in existing buildings for operating tools and testing of equipment will be furnished by the User Agency at no charge, but the Contractor shall provide any required temporary facilities and remove same when no longer required.

1.3 BARRICADES, LIGHTS, AND WATCHMEN

A. Where the work is constructed in or adjacent to any road, parking area, or public place, the Contractor shall, at his own cost and expense, furnish and erect such barricades, lights, and danger signals, shall provide such watchmen, and take such other precautionary measures for the protection of persons and property and of the work, as are necessary. At the completion of construction, all barricades and all traces thereof, shall be removed, holes filled, paving repaired, etc.

1.4 TEMPORARY LADDERS, SCAFFOLDS, HOISTS, ETC.

A. Contractor shall provide and maintain all equipment such as temporary ladders, ramps, scaffolds, hoists, runways, derricks, chutes, etc., as required for the proper execution of the work.

B. All such apparatus, equipment, and construction shall meet all requirements of the Labor Law and other Federal and State Laws applicable thereto.

C. Contractor shall provide, maintain, and remove at completion of work all scaffolding required for the execution of the work. Erect scaffolding on the side of the wall on which work occurs. No scaffolding shall be built into any work.

D. Scaffolding for all other work shall be provided, installed, maintained, and removed at completion of work by the trade requiring such scaffolding.

1.5 STORAGE OF MATERIALS

A. Refer to Division 1 Section 01600, "Material and Equipment."

B. Building materials, Contractor's equipment, etc., shall be stored on the premises in a manner so that it may be observed at any time by the Architect.

C. All materials affected by the weather shall be covered and protected and kept free from damage while being transported to the site.

D. Subcontractors desiring to store materials scheduled for immediate use in the building may do so only in locations as directed by the Prime Contractor and approved by the Architect.

1.6 CONTRACTORS FIELD OFFICE

A. Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes.

B. The office shall be located convenient to the work. It shall be adequately heated, ventilated, electrically lighted, and provided with telephone service, all at the expense of the Contractor.

1.7 SANITARY FACILITIES

A. Provide single-occupant, self-contained toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar non-absorbent material. Contractor shall keep such place in sanitary condition and remove at completion of contract. Facility fixtures shall not be used by workmen. Comply with all applicable codes, utility, and safety regulations.

1.8 LAYING-OUT OF WORK

A. Contractor shall compare all drawings and verify all dimensions, and shall take any and all measurements necessary to verify the drawing dimensions in relation to conditions already established at the job site before laying out the work. Contractor will be held responsible for subsequent errors which could have been avoided by such checking.

B. Any discrepancy which will affect the proper layout of the work shall be immediately called to the attention of the Architect by the Contractor. No work shall proceed until such discrepancy has been rectified as directed by the Architect.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01500

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions, apply to the work specified in this Section. Refer to other Division 1 Sections for additional requirements which may affect the work of this Section.

1.2 RELATED REQUIREMENTS

A. Warranty: General Conditions, 3.5.

B. Substitutions: Division 0 Section 00100, "Instructions to Bidders."

1.3 GENERAL PRODUCT REQUIREMENTS

A. Provide products, materials, and equipment which comply with the requirements and which are undamaged and unused at the time of installation, and which are complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.4 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with Manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Engineer. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust product in strict accord with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with Manufacturer's instructions, consult with Engineer for further instructions. Do not proceed with work without clear instructions.

C. Perform work in accord with Manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.5 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and those products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by method to prevent soiling or damage to products or packaging.

1.6 STORAGE AND PROTECTION

A. Store products in accord with Manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in weathertight enclosures. Maintain temperature and humidity within the ranges required by Manufacturer's instructions.

B. Exterior Storage: Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

D. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF REQUIREMENTS

A. Definitions: Project closeout is the term used to describe certain collective project requirements, indicating completion of the work that is to be fulfilled near the end of the contract time in preparation for final acceptance and occupancy of the work by the Owner, as well as final payment to the Contractor and the normal termination of the Contract.

B. Specific requirements for individual units of work are included in the appropriate Sections in Division 2 through 16.

1.3 CLOSEOUT SUBMITTALS

A. Submit to Architect for review, four copies each of the following items and other items as specified. Approved copies will be transmitted to Owner by Architect.

B. Operation and Maintenance Data: Refer to Article titled "Operation and Maintenance Manuals" hereinafter this Section.

C. Record Drawings: Refer to "Record Drawings" article hereinafter this Section (one copy required).

D. Release of Liens: AIA Form G706A, refer to Article 9.10 of the General Conditions.

E. Consent of Surety to Final Payment: AIA Form G707, refer to Article 9.10 of General Conditions.

1.4 OPERATION AND MAINTENANCE MANUALS

A. Purpose: Operation and Maintenance Manuals will be used for training of, and use by, the Owner and his employees in the operation and maintenance of the systems and related equipment as specified below. A separate manual or chapter shall be prepared for instructions of each class of equipment or system.

B. Contents: Manuals shall contain the following information on each item of equipment:

1. Routine maintenance operations.
2. Complete operating instructions.
3. Service instructions.

4. Complete control wiring.
5. Emergency procedure.
6. Equipment warranties or guarantees.
7. A complete list of equipment with all nameplate data both in the manual and in a Microsoft Excel file.
8. A compact disk (CD) with PDF files of the operation, maintenance and parts list for all major equipment.
9. Provide PDF files of the complete Operation and Maintenance Manual including; Test, Adjust and Balance Report, warranties, and equipment list for Engineer to review prior to printing Manuals.

C. Preparation: The manuals shall be prepared to provide for the optimum operation and maintenance of the various systems outlined above and equipment forming a part of these systems. Manufacturer's literature and data shall be that of the actual equipment installed under contract for the particular facility. Each manual containing the systems noted shall be bound in one or more volumes as required for convenience in handling.

1.5 INSTRUCTIONS

A. Instruct Owner's personnel in operation of all systems, mechanical, electrical, and other equipment in accordance with respective Specification Sections and Manufacturer's instructions.

1.6 RECORD DRAWINGS

A. Mark-Up Procedure: During progress of work, maintain a white-print set of Contract Drawings and Shop Drawings, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Where Shop Drawings are marked up, cross-reference on Contract Drawings at corresponding location. Mark with erasable colored pencil, using separate colors where feasible to distinguish between changes for different categories of work at same general location. Mark-up important additional information which was either shown schematically or omitted from original drawings. Give particular attention to information on work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, change order numbers, and similar identification.

B. Submittal: At the conclusion of the Contract, the final set of record prints shall be prepared by the Engineer from information obtained from the Contractor.

1.7 CLEANING UP

A. No rubbish shall be allowed to accumulate or be allowed to remain on the premises or job site beyond a reasonable length of time. Trash shall be removed from within the building and from the site daily. Particular attention shall be given to these requirements.

B. All rubbish shall be removed by means of chutes, hoists, or receptacles. Under no circumstances shall any rubbish or waste be dropped or thrown from one level to another within or outside the buildings. Immediately after unpacking materials, all packing case lumber and other packing

materials, excelsior, wrappings, and other like flammable wastes shall be collected and removed from the buildings and premises. Burning of trash on the site will not be permitted.

C. Care shall be taken by all workmen not to mark, soil, or otherwise deface any finishes. In the event that any finishes become defaced in any way by mechanics or workmen, the Contractor or any of his Subcontractors shall clean and restore such surfaces to their original condition.

D. Each Subcontractor engaged upon the work shall bear his full responsibility for leaving all work in a clean and proper condition, satisfactory to the Owner and the Architect.

E. Final Cleaning: Beside the general broom cleaning, the following cleaning shall be done just before final acceptance of the work:

1. Remove all labels not intended for permanent installation.
2. Remove all marks, stains, fingerprints, and other soil or dirt from all painted work, and clean as required to leave in first class condition.
3. Clean all equipment removing all stains, paint, dirt, and dust.

F. Upon completion of the work, the Contractor will be required to thoroughly clean the building site and surrounding ground, and all trash and rubbish left by him in the course of construction of the work shall be removed and disposed of off the site of work.

G. Contractor shall haul off all debris from the site to legal disposal areas and dispose of all debris and excess materials resulting from project work. No burning of material or debris shall be done at site. In hauling material from the site, it shall be the responsibility of the Contractor to prevent debris from dropping from vehicles and littering the site and any public thoroughfare.

1.8 SUBSTANTIAL COMPLETION

A. Inspection and other procedures for Contractor to follow to process Contract through Substantial Completion are specified in General and Supplementary Conditions, Articles 9.8 and 9.9.

1.9 FINAL INSPECTION

A. Contractor shall submit written certification that:

1. Contract Documents have been reviewed.
2. Project has been inspected for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
5. Project is completed, and ready for final inspection.

B. Engineer will make final inspection after receipt of certification.

C. Should Engineer consider that work is not finally complete, he will notify Contractor, in writing, stating reasons. Contractor shall take immediate steps to remedy the stated

deficiencies, and send second written notice to Architect certifying that work is complete. Architect will reinspect work.

1.10 FINAL PAYMENT

A. Application for final payment shall be submitted together with documents specified in General and Supplementary Conditions, Article 9.10 "Final Completion and Final Payment."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01700

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

Individual trade sections and the drawings indicate specifically the work required.

It should be noted that The General Conditions AIA 201, provide for the following:

Supervision and Construction Procedures
Cutting and Patching
Protection of Persons and Property

DESCRIPTION OF WORK:

The extent of selective demolition work is generally indicated on drawings. Provide all required materials, equipment and labor to execute the required selective demolition.

Demolition Work: Demolition requires the selective removal and subsequent off site disposal of the following installations:

Removal of rooftop units, air handling units, outdoor heat pumps, ductwork, piping and controls.

Removal of ceiling tiles and all associated grids and supports as required for new work.

Removal of fuel gas piping, condensate drain piping and electrical.

Items Not to be Removed or Disturbed

The architect and/or engineer is to be contacted before removal, cutting, disturbing, or tampering in any manner with any item which has or may have any structural property, including walls, beams, joists, lintels, columns, sills, window mullions, etc.

Asbestos-Containing Materials: The following are asbestos-containing or asbestos-contaminated installations which are not to be disturbed during work of this section:

Vinyl asbestos floor tile (For area not included to be abated)

Salvaged equipment and materials

Materials and equipment designated for salvage shall be removed and stored on site as directed, or reinstalled where indicated.

Related work specified elsewhere:

Relocation of pipes, conduits, ducts, other mechanical and electrical work are specified by

respective trades.

SUBMITTALS:

Waste Management Plan: Submit plan prior to beginning demolition.

Plan shall include the following:

1. List of items to be salvaged for reuse on site.
2. List of items to be removed for owners use Salvaged items shall be delivered by the contractor to:

CPSB Maintenance Warehouse
7300 West Bert Kouns Loop
Shreveport, LA 71129

3. Plan for final disposition of rooftop units, air handling units, air terminals and refrigerant (re-cycled, reused, or disposed in landfill, etc.)

Schedule: Submit schedule indicating proposed methods and sequence of operations for demolition work to Owner's Representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

Coordinate with Owner's continuing occupation of portions of existing building.

JOB CONDITIONS:

Occupancy: Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will impact Owner's normal operations.

Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

Partial Demolition and Removal: Items indicated to be removed but of salvable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

Storage or sale of removed items on site will not be permitted.

Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.

Erect temporary covered passageways as required by authorities having jurisdiction.

Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

Protect floors with suitable coverings when necessary.

Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.

Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.

Remove protections at completion of work.

Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

Explosives: Use of explosives will not be permitted.

Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, acceptable to the Owner.

Environmental Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions, such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

INSPECTION:

Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure, surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from selective demolition work. Submit copies of photographs to Owner's Representative prior to starting work. If documentation is not submitted to the Owner's Representative prior to start of work the Contractor assumes all responsibility for existing conditions and

the repair during or at the completion of the work.

PREPARATION:

Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

Cover and protect furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

Erect and maintain dustproof partitions and closures as required for preventing the spread of dust or fumes to occupied portions of the building.

Provide weatherproof closures for exterior openings resulting from demolition work.

Work Site Isolation: Isolate the site of selective demolition work from occupied portions of the building prior to start of demolition activities. Work site isolation includes:

Erection of Critical Barriers as described in Section CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

Installation and operation of Pressure Differential and Ventilation System.

Locate, identify, stub off and disconnect utility services that are not indicated to remain.

Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during change-over.

DEMOLITION:

Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

Asbestos contamination: If a disturbance of asbestos-containing materials occurs stop all work and notify the Owner's Representative at once. Work may not resume until the Owner's Representative issues a written clearance to resume work.

DISPOSAL OF DEMOLISHED MATERIALS:

Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project site.

CLEAN-UP AND REPAIR:

Upon completion of demolition work, remove tools, equipment and demolished materials from site.

The premises shall be kept clean and free of debris which may cause a health, safety or other project related problem. Remove protections and leave interior areas broom clean.

Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED WORK

A. Testing Laboratory Services: Division 1 Sections.

B. Site Clearing: Division 02 Sections.

1.2 SYSTEM DESCRIPTION

A. Excavation, backfilling, filling, and grading for the following:

1. Foundation Structures.
2. Site Work Concrete.
3. Site Improvements.

1.3 SUBMITTALS

A. Test Reports. In accordance with Division 1 Sections, the Testing Laboratory shall submit the following reports:

1. Liquid limits and plasticity index on borrow or existing material to be used as a base beneath concrete slabs, paving, and walks. Approval of tests on base material shall be obtained prior to placement of base material.
2. Field soil density test reports.

B. Topsoil Report: Submit copies of soil analysis report for stock piled on-site and proposed new off-site topsoil if on-site topsoil is unacceptable or if insufficient quantity.

1. Before placement of topsoil, furnish a soil analysis made by an approved soil testing laboratory stating the percentages of silt, clay, sand, and organic matter, the pH and the mineral content of the topsoil.

1.4 SITE CONDITIONS

A. Unknown Utilities & Obstacles: If any unknown or uncharted utilities are encountered during excavation, promptly notify the utility company and the Engineer and if no emergency exists wait for the Engineers instructions before proceeding.

1. If it is ascertained that such utility line has been abandoned, the Contractor shall properly cap the line at a depth of 12 inches or more below finish grade.
2. Unknown Obstacles: Should Contractor encounter any unforeseen major obstacle in excavation, it is the intention of the Owner to cause an investigation to be made to determine a course of action that will provide for a fair and equitable solution.

PART 2 - PRODUCTS

2.1 BACKFILL

A. Shall be approved sand-clay mixture, free of vegetation, debris, waste, and other deleterious matter. Stones larger than 2 inches, maximum dimension, shall not be used in upper 6 inches of fill. Material removed from project excavation, if approved, shall be used for backfill. Provide any additional fill material from off-site source as necessary to produce required grades.

2.2 SELECT FILL

A. Shall be sandy clay or clayey sand (CL or SC groups as per ASTM D-2487). Excavated material may be used from the Project site provided it complies with the following requirements or is made to comply through the use of approved admixtures such as sand or lime.

1. Liquid Limit: 35 max. (AASHTO T-89).
2. Plasticity Index: 5 to 15 max. (AASHTO T-90).
3. The fill shall contain no stones larger than 2 inches in any dimension, or organic matter and debris.

2.3 TOP SOIL

A. A natural, fertile, friable soil possessing characteristics of representative productive soils in the vicinity with a minimum pH of 4. It shall not be excessively acid or alkaline or contain toxic substances which may be harmful to plant growth. It shall be free of weeds, seeds, lumps, stones, debris, roots, or similar substances larger than one inch. Soil may be used from the project site with approval from the Engineer provided it complies with these requirements.

2.4 TOPSOIL REMOVAL

A. Remove topsoil to its entire depth from the areas within lines of project limits 10 feet outside of foundation and from areas to be occupied by paving, walks, and from cut and fill areas. Pile topsoil in designated or approved locations where it will not interfere with building or utility operations. Areas to be stripped shall first be scraped clean of all brush, weeds, grass, roots, and other material that will interfere with lawn maintenance. Topsoil shall be reasonably free from subsoil, debris, and stones larger than one inch in diameter. The stored topsoil shall be left in piles to be used for finished grading.

2.5 PREPARATION – PROTECTION

A. Control of Water: The Contractor shall exercise reasonable care to maintain the site and all excavations free of water at all times especially in the area of and around the building. The contractor shall, after inspection, testing, and approval, fill all excavations and trenches as soon as possible, as specified.

1. Standing water shall not be allowed at the site and shall be removed within a reasonable period of time.

B. Existing Utilities: Before starting any excavation work, Contractor shall locate all existing utilities. Existing utilities to remain shall be protected at all times by approved methods. Damage to existing utilities as the result of Contractor's operations and/or improper protection shall be repaired immediately to the satisfaction of the utility company and/or the Owner without additional expense to the Owner.

C. Other Trades: Protect, as necessary to avoid damage, the equipment, materials, and the installations of other trades who are executing work currently with work of this Section until work of this Section has been completed.

D. Excavations and new work shall be maintained and protected from cave-ins, slides, settlement, and other injurious conditions by bracing, shoring, and other methods which will enable the work to be carried on safely and expeditiously.

2.6 EXCAVATION

A. Unclassified: All excavation shall be unclassified, which shall comprise and include the satisfactory removal and disposition of all materials excavated, regardless of the nature of the materials encountered, at no additional expense to the Owner. Neither the condition of the material at the time it is excavated nor the manner in which it is excavated will have any bearing on or will be given consideration in the classifying of the excavation.

B. Storage: Excavated material shall not be deposited in any manner that will endanger a partly finished structure or that may be detrimental to the work or adjacent facilities and structures in any way. Excavated material shall be handled in such manner as to allow all selected material to be used for backfilling and filling operations of this project. Excess material shall be removed from project site and legally disposed of by the Contractor.

C. Cuts. Excavations shall be cut accurately to the lines, levels, and dimensions necessary for the completion of all work as indicated and specified.

D. Unauthorized Excavation. Except for concrete footing and foundation work requiring soil bearing, all unauthorized excavations below the required depths shall be backfilled with approved material and compacted, as specified hereinafter, without additional expense to the Owner.

1. Unauthorized excavations below the required depths for concrete footing and foundation work requiring soil bearing shall be filled with approved concrete by extending the footing to the new depth, without additional expense to the Owner.

2.7 CRIBBING AND SHORING

A. Provide temporary and/or permanent cribbing and shoring as necessary to safely retain earth banks and protect excavations from caving and other damage. Responsibility for the design, installation, and maintenance of cribbing, sheathing, and shoring required by job conditions is the obligation of the Contractor. All temporary cribbing and shoring shall be removed and legally disposed of off the site when directed or when no longer necessary.

2.8 BACKFILL AND FILL

A. Preparation. Backfill excavations as promptly as work permits, but not until completion of following:

1. Completion of construction below finish grade including, where applicable, damp proofing and waterproofing.
2. Inspection, testing, approval, and recording locations of underground formwork.
3. Removal of concrete framework.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
5. Removal of trash and debris.

2.9 PLACEMENT AND COMPACTION

A. Place backfill and fill materials in layers 6 inches to 8 inches thick in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Soil density requirements are specified herein this Section.

B. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content of the soil material. Compact each layer to the required percentage of maximum dry density or relatively dry for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

C. Place backfill and fill materials evenly adjacent to structures, to the required elevations. Take care to prevent wedging action of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

D. Provide and place additional earth fill materials needed to bring existing grades to new subgrades indicated in preparation for placing topsoil, paving, or other indicated construction.

E. Placement of Trench Fill: Trenches shall be compacted in 8 inches layers starting from the bottom.

2.10 COMPACTION AND SOIL TESTS

A. Quantity. The number and location of compaction and soil tests shall be determined by the Engineer, but shall be no less than three tests per 8 inches lift.

B. Payment: Refer to Division 0 Sections.

C. Test Requirements: Soil Density – degree of compaction of fill shall be the percent of maximum density as specified immediately hereinafter, density at or above optimum moisture content. Degree of compaction shall be as determined by ASTM D-698, standard Proctor and AASHTO T-238 (Nuclear Method field test). Each layer shall be compacted, tested, and approved before another layer is added.

2.11 SCHEDULE OF REQUIREMENTS

A. General: The percentages stated in following schedule refer to the soil density requirements as stated in preceding article "Test Requirements." Compaction requirements shall be considered to be uniform throughout for the indicated area: i.e., in cut, fill, and undisturbed soils.

B. Beneath Building

1. Subgrade: Grade (cut and/or fill) to elevations indicated. Add select fill to bring the grade up to required elevations and compact to 93 percent.
2. Finish-grade: Top layer to be type and thickness of soil material and compaction required for the specific area.

C. Pipe Trenches

1. Pipe shall be installed on 6 inches thick bed of sand fill. After piping has been tested, place an additional 6 inches layer of sand in trench. Minimum coverage of sand fill surrounding pipe in all directions shall be 6 inches. Compact sand to 93 percent. Place select fill on sand to top of subgrade elevation, compact to 93 percent.
2. Finish-grade: Top layer to be type and thickness of soil material and compaction required for the specific area.

D. Beneath Concrete Paving

1. Subgrade – Remove existing subgrade to 1’ minimum below existing grade under paving, use acceptable excavated soils or, add select fill to bring the grade up to required elevation and compact to 90 percent.

2. Fill to required finish grade with approved CL or SC soils and compact to 93 percent maximum density.

E. Lawns and Landscaped Areas

1. Subgrade: Grade (cut and/or fill) to the elevations required by the Drawings and Specifications. Use the existing soil from the site or add soil equal to the sites soil to bring the grade up to the required elevations and compact to the approximate density of the material soil at the site. The soil shall be free of all plant material, wood, trash, building materials, rock, and stones larger than one inch.
2. Finish-grade: Install a minimum of 4 inches thickness of top soil, grade to elevations required and compact to the approximate density of the material soil at the site.

F. Unsatisfactory Compaction: When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

2.12 GRADING TOLERANCES

A. Grading (cut and/or fill) shall be to the elevations as shown and as specified. Unless closer tolerances are required, the maximum deviation from indicated or interpolated elevations shall be plus or minus 1 inch in ten feet.

B. Areas paved with concrete sidewalks: Grade to elevations coinciding with the bottom of the concrete paving which is specified to be furnished and installed under another Section. Maximum deviation from indicated or interpolated elevations shall be plus or minus 1/2 inch in ten feet.

C. Areas under concrete slabs on grade. Grade to elevations coincided with bottom of the capillary water barrier. Maximum deviation from indicated or interpolated elevations shall be plus 0 inches or minus 1/2 inch in ten feet.

D. Grass and Landscaped Areas. Rough grade to elevations indicated, less approximately 4 inches for placement of loose top soil obtained from the site or from approved sources from off the site. Approval shall be obtained before using material from the site. Just prior to completion of the project, all areas shall be raked, compacted if necessary, and finish graded to indicated elevations with a maximum deviation of plus or minus 1 inch. All areas shall be clean and free from debris and rocks.

E. Tolerances referred to above are not additive and can occur only within their specific length.

2.13 PLACING GRANULAR BASE

A. Place granular based over subgrade where indicated or specified to required thickness. Spread evenly over the area and compact to maximum density. Bring to even grade at required elevation.

2.14 PLACING TOP SOIL

A. After rough grading has been compacted, place approved top soil material where indicated to a minimum depth of 4 inches. Sprinkle with water to compact. Re-grade after compaction to smooth, uniform condition free of debris and stones larger than one inch.

2.15 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove waste materials including excavated material classified as unsatisfactory soil material, trash, and debris, and dispose of it off the Owner’s property.

2.16 PROTECTION

A. Newly graded areas shall be protected from traffic, erosion, and any settlement or washing away that may occur from any cause, prior to date of Substantial Completion, shall be repaired and grades re-established to required elevations and slopes. Temporary erosion control fencing shall be provided around construction perimeter, and shall be placed in accordance with LADOTD EC sTp Drawings.

END OF SECTION 02300

SECTION 02920 - LAWNS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. The extent of lawn work shall be the damaged by the Contractor during construction. It shall also include the re-sodding of existing lawn areas damaged by Contractor's operations. The types of work required include the following:

1. Preparation of lawn areas.
2. Sodding of lawn areas affected by construction.

1.3 RELATED SECTIONS

A. Grading, Placing Topsoil: Division 2 Section 02 30 00, "Earthwork."

1.4 ENVIRONMENTAL REQUIREMENTS

A. Work shall be performed only during period when beneficial results are likely to be obtained. When conditions are such, by reason of drought, excessive moisture, or other factors, that satisfactory results are not likely to be obtained; work shall cease and be resumed when desired results are likely to be obtained.

1.5 WARRANTY

A. Contractor shall insure establishment of a viable, uniform, dense stand of grass within lawn areas, by use of methods specified herein, until final acceptance of Project or for a 60 day period, whichever is greater.

PART 2 - PRODUCTS

2.1 FERTILIZER

A. Granular approved commercial brand conforming to the requirements of the State Department of Agriculture. Nitrogen-Phosphorus-Potassium rates shall be 8-8-8 or 12-12-12, or 13-13-13.

2.2 SOD

A. Strongly rooted sod, not less than 2 years old, from off-site source; free of weeds, undesirable plants, large stone and other material detrimental to development and maintenance of lawn. Provide sod composed principally of the same grasses as the surrounding lawn.

PART 3 - EXECUTION

3.1 FERTILIZER

A. Shall be applied to all new lawn areas not more than 24 hours in advance of tilling and seeding operations. Rate of application shall be as follows:

	Type	Pounds Per 1000 Sq.Ft.	Pounds Per Acre
1.	8-8-8	23	1,000
2.	12-12-12	15.3	667
3.	13-13-13	14.1	615

3.2 TILLAGE

A. After application of fertilizer, new lawn areas shall be tilled to depth of 4 inches, using chisel or disk-type breaking plow followed by discing, harrowing, and culti-packing. When chisel plows are used, areas shall be cross-tilled with chisels set not to exceed 10 inches apart.

3.3 SOLID SODDING

A. Provide sodding on all damaged lawns. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, drains, and seeded areas.

B. Peg sod on slopes steeper than 3 to 1 to prevent slippage at a rate of 2 stakes per yd. of sod. Water sod thoroughly with a fine spray immediately after laying. Roll with light lawn roller to ensure contact with sub-grade.

3.4 PROTECTION

A. Maintenance period for new lawn areas shall begin immediately after planting and extend for a period of 60 days or until final acceptance of Project by Owner, whichever period is greater.

B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

C. Watering: Provide and maintain temporary piping, hoses, and lawn watering equipment as required to convey water from water sources and to keep lawn areas uniformly moist as required for proper growth.

1. Mow lawns as soon as there is enough top growth to cut with mower set at 2-1/2 to 3 inches height. Repeat mowing as required to maintain specified height. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.
2. Re-sod any area that becomes damaged or does not produce an acceptable growth of grass.

3.5 ACCEPTANCE

A. Sodded lawns will be acceptable, provided all requirements including maintenance, have been complied with, and a healthy, well-rooted, even-colored, viable lawn is established, free of weeds, open joints and bare areas.

END OF SECTION 02920

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Metal Fabrications: Section 05500.

1.2 SUBMITTALS

A. Shop Drawings shall be submitted for review in accordance with Section 01300. Material shall not be fabricated or delivered to site before reviewed shop drawings have been returned to Contractor.

1. Erection diagrams shall show wind connections, holes or sleeves for mechanical trades and cover plates (size, location and length) as indicated on the structural drawings. All erection marks on the erection diagrams shall be cross referenced directly to shop details, indicating piece number and shop detail sheet number. Index sheets may be used as an alternative.
2. Each steel member shall be dimensionally located in plan on the erection diagrams. The size and grade of steel for each component part of the structure shall be clearly indicated. Details for bolted connections shall define the size, quantity, and grade of bolts and the number of washers required for each bolt. Each field bolted connection shall be clearly identified in the shop drawings as a friction connection. Fit up requirements for bolted connections shall be clearly detailed.
3. Welds shall be detailed to conform to the requirements of AWS A2.0, "Standard Welding Symbols." Welding procedure specifications shall be outlined in the shop drawings for all welds.

B. Test Reports or mill certificates shall be submitted for approval as specified hereinafter under "Mill Reports."

C. Mill Reports. Furnish steel mill shipping statements and certified mill reports of heat and melt numbers on steel to be used in Project.

D. Welders' Certificates. Submit certificates as specified under "welding operators qualifications".

1.3 QUALITY ASSURANCE

A. Codes and Standards. Comply with provisions of following, except as otherwise indicated.

1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
2. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings."
3. AISC "Specifications for Structural Steel Buildings -- Allowable Stress Design" including "Commentary" and Supplements thereto as issued.
4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."

5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Welding Operators Qualification. Welders and welding operators shall have passed the applicable AWS qualification tests prescribed in AWS D1.0. All welding shall be performed by certified welders. Certification shall have been achieved in the twelve calendar months including and immediately preceding the date the subject welder begins work under the Contract.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Steel with Shapes ASTM A992

B. Steel, Bars, Plates: ASTM A-36.

C. Channels, Angles, Anchor Bolts: ASTM A36 or ASTM A-307 nonheaded, Grade A.

D. Steel pipe ASTM A53 Grade B.

E. Standard Fasteners: Bolts, nuts, washers complying with ASTM A-307, 3/4” minimum diameter.

F. Galvanizing (all exposed exterior members and plates): Shall conform to ASTM A-123, 1.8 oz. / sq. ft.

G. Shop Paint Primer (interior steel members and plates): Alkyd based, iron oxide; 50% minimum - volume solids. Acceptable products include "Series 4 Versare Primer" by Tnemec, "KemBond HS Primer H50 Series" by Sherwin-Williams, 5105 by Ameron or approved equal.

OR

H. Shop Paint Primer (interior steel members and plates): Alkyd based, zinc chromate pigment; 50% minimum. volume solids. Acceptable products include "Tneme-zinc 90-96" by Tnemec, "Zinc chromate Primer B 50Y-1" by Sherwin-Williams, "Dimetcote 9FT" by Ameron.

I. Nonshrink Nonmetallic Grout. Premixed, factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C-1107 of consistency suitable for application.

J. Epoxy Bonder: Conforming to ASTM C881, Type III, Grade 1 or 2, Class C.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

B. Shop Connections: Weld or bolt as indicated.

C. Field Connections: As indicated on drawings. All field welds will be continuous unless noted otherwise. Seal welds shall be provided for exterior steel field welded connections.

D. Standard Fasteners: Provide standard threaded fasteners for principal bolted connections.

E. Preparation for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings. Provide threaded nuts which work. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. Shop Painting: Shop paint all steelwork, except parts of steel that are to be field welded. Parts which are inaccessible after assembling shall be given two shop coats of paint.

1. Surface-Preparation. Surfaces to receive shop coat of primer shall be prepared in accordance with SSPC-Sp-3, No. 3, power tool cleaning.
2. Primer Application shall be in accordance with SSPC-Paint System Guide No. 7 to a minimum dry-film thickness of two mils.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.2 FIELD ASSEMBLY

A. General: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

B. Erection Bolts: On exposed welded construction, tighten erection bolts, and leave in place. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

C. Torch Cutting: Do not use gas cutting torches in field for correcting fabrication errors. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

D. Splices: Not permitted, except where specifically allowed on plans.

E. Field Connection Type: Welded.

F. Welded Construction: Technique of welding employed, appearance, quality of welds, methods used in correcting defective work, shall conform in workmanship to Section 3 of AWS D1.1 Structural Welding Code. Materials used and details of all joints for any work included shall comply with requirements of American Welding Code for Arc and Gas Welding in Building Construction. Welds shall be continuous unless indicated otherwise.

3.3 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 8.0 mils.

3.4 FIELD QUALITY CONTROL

A. Erection Tolerances: The work in place shall comply with AISC erection specification requirements of the "Code of Standard Practice for Steel Buildings and Bridges". These tolerances are partially given as follows. Individual pieces shall be erected so that deviation from plumb, level and alignment shall not exceed 1 to 500.

B. Inspection: All material, including shop and field welding and the installation of bolts, shall be subject to inspection in the shop and field by an inspection agency.

1. The Contractor shall cooperate with the inspection agency and shall furnish, free of charge, all electrical power, turning or moving of members, hoisting, staging, shanties, moving of inspection equipment and other facilities required for inspection. Testing machines, testing machine operators, and testing materials used for inspection will be furnished by the inspection agency.
2. Welding Acceptance. Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of AWS D1.1 and the contract drawings. Nondestructive testing shall be by visual inspection.

END OF SECTION 05120

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Shop or mill fabricated metal items made from steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. Types of work in this section include metal fabrications for:

1. Loose bearing plates.
2. Miscellaneous framing and supports.
3. Metal bar grating.

1.3 RELATED SECTIONS

A. Structural Steel: Section 05120.

1.4 SUBMITTALS

A. Shop drawings shall be submitted for all items specially fabricated under this Section. Begin fabrication only after receiving reviewed shop drawings. Shop drawings shall show thickness of metals, profiles of extrusions, finishes, steel reinforcing, anchoring to structure, and connections to adjacent work.

B. Manufacturer's Data for standard manufactured products shall include specifications, anchor details, installation instructions, paint products.

C. Samples: Submit samples of finish materials for Engineer’s approval, i.e. aluminum, stainless steel.

PART 2 - PRODUCTS

2.1 BASE MATERIALS

A. Steel:

1. Structural W shapes shall be ASTM A-992.
2. Steel channels, angles and plates shall be ASTM A36.
3. Bars shall be ASTM A-108.

4. Structural tubular shall be square or rectangular, ASTM A-500, GRB.
5. Sheets shall be cold-rolled, ASTM A-366.
6. Pattern Floor Plate, ASTM A-786.
7. Tubing shall be cold-drawn, ASTM A-512.
8. Pipe shall be ASTM A-53, Schedule 40 unless indicated otherwise.
9. Bolts shall be ASTM A-307 as applicable.
10. Galvanized steel sheets shall be ASTM A-526, with 1.25 oz., galvanizing, ASTM A-525.

B. Shop Paint Primer (Interior Steel Only): Alkyd based, iron oxide; 50% minimum volume solids, Acceptable products include "Series 4 Versare Primer" by Tnemec, "Kem Bond HS Primer H50 Series" by Sherwin-Williams, 5105 by Ameron or approved equal.

OR

C. Shop Paint Primer: Alkyd based, zinc chromate pigment; 50% minimum. volume solids. Acceptable products include "Tneme-zinc 90-96" by Tnemec, "Zinc chromate Primer B 50Y-1" by Sherwin-Williams, "Dimetcote 9FT" by Ameron.

D. Galvanizing Repair Paint (Exterior Steel Only): A high zinc dust content paint for coating welds in galvanized steel; compound shall have minimum of 94% zinc dust in the dry film.

E. Galvanizing (Exterior Steel Only): All exposed steel shall be galvanized in accordance with ASTM A-123, A-153, or A-525 as applicable, 1.8 oz./sq.ft.

2.2 FABRICATION

A. Contractor shall verify measurements in the field before fabrication. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Provide miscellaneous bolts and anchors, supports, braces, and connections necessary for completion of the work.

B. Shop Welding: Weld corners and seams continuously, complying with AWS recommendations for shop welding. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

C. Shop Painting and Protective Coatings: All ferrous metal, except stainless steel and items indicated to be galvanized, shall be properly cleaned and given one shop coat of primer. Metal work to be encased in concrete shall be left unpainted unless specified or noted otherwise. Castings shall be cleaned and coated with a bituminous based paint, unless specified otherwise.

1. Surface preparation shall be in accordance with SSPC-SP3, power tool cleaning. DFT shall be 2.0 mils. min.

D. Galvanizing: Where miscellaneous steel items are indicated on Drawings or specified hereinafter to be galvanized, galvanized coatings shall conform to following. Hot-dip galvanizing or zinc coatings applied on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips shall comply with ASTM A-123, A-153 or A-525 as applicable, 1.8 oz./sq. ft.

1. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for paint.

2. Galvanizing shall be done after fabrication except for bolts and nuts.

2.3 MISCELLANEOUS ITEMS

A. Loose Bearing Plates: Provide loose bearing for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

B. Carbon Steel expansion anchors shall be submitted for approval. Minimum ultimate sheer capacity per anchor shall be 22,000 lbs.

C. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
2. Fabricate miscellaneous units to sizes, shapes and profiles shown, or if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction, using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
3. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Except as otherwise shown, space anchors 24" o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

D. Steel Bar Gratings:

1. General: Material shall be structural carbon steel. Ends of grating panels and cut out areas shall be provided with banding strips of same depth and thickness as main bars. Gratings shall be of size indicated on drawings.
2. Connections: Welded or riveted.
3. Top Surface: Flush, aluminum oxide grit-epoxy bonded to grating.
4. Finish: Galvanized.
5. Manufacturers: IKG/Borden, Tru-weld, Ohio Gratings, or approved equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before starting erection, Contractor shall secure field measurements pertaining to or affecting the work of this Section. Verify the location and exact positions of support framing. Should deficiencies and/or errors be found in previously installed work which could affect the miscellaneous metalwork, such deficiencies and/or errors shall be corrected before proceeding with erection of the miscellaneous metalwork.

3.2 ANCHORAGE:

A. Anchorage shall be provided as required and as necessary for fastening metalwork items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts, expansion shields, and power-driven fasteners for concrete.

3.3 FIELD WELDING

A. Comply with AWS code for procedures of manual shielded-arc welding, appearance and quality of weld made, and methods in connecting welding work. Coat weld areas of galvanized items with galvanizing repair paint.

3.4 CORROSION PROTECTION

A. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

B. For steel anchors and connection members in contact with aluminum apply shop coat red lead and oil, or lead chromate primer; follow with 2 coats approved aluminum of bituminous paint; or hot-dip galvanize.

3.5 INSTALLATION - GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts.

1. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or similar construction. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

3.6 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils. Exposed steel shall receive minimum dry film thickness of 8.0 mils.

END OF SECTION 05500

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

SUMMARY

This Section includes sheet metal flashing and trim in the following categories:

Metal flashing.

PERFORMANCE REQUIREMENTS

General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

Fabricate and install flashings at roof to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the appropriate wind zone.

SUBMITTALS

Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

QUALITY ASSURANCE

Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Warranty: Manufacturer’s Warranty – Furnish a 20 year warranty on pre-finished metal’s finish.

PROJECT CONDITIONS

Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

PART 2 - PRODUCTS

METALS

Roof Curb Flashing, Galvanized Steel Sheet: ASTM A 526, G 90 (ASTM A 526M, Z 275), commercial quality, or ASTM A 527, G 90 (ASTM A 527M, Z 275), lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

> Factory-Painted Aluminum Sheet: ASTM B 209 (ASTM B 209M), 3105-H14, with a minimum thickness of 0.040 inch (1.0 mm), unless otherwise indicated. Finish shall be Kynar 500 or Hylar 5000 based finish coating.

Architectural Exterior Flashing, Pre-Finished Sheet Steel: 24 gauge hot-dipped galvanized steel (G90), Finish face Kynar 500 or Hylar 5000 based finish coating. Reverse side - manufacturers standard washcoat of .3 - .4 mil dry film thickness.

MISCELLANEOUS MATERIALS AND ACCESSORIES

Solder: ASTM B 32, Grade Sn50, used with rosin flux.

Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.

Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

Paper Slip Sheet: 5-lb/square red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.

FABRICATION, GENERAL

Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

SHEET METAL FABRICATIONS

General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

Exposed Flashing and Trim: Fabricate from the following material:
Roof curbs - Galvanized Steel: 26 ga.
Architectural - Pre finished sheet steel: 24 ga.

Roof-Penetration Flashing: Fabricate from the following material:
Galvanized Steel: 26 ga.

SHEET METAL FINISHES

Field finish all metal items excluding aluminum in accordance with the requirements of Division 9 Section "Painting".

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION

General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.

Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

Use joint adhesive for nonmoving joints specified not to be soldered.

Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

Underlayment: Where installing aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.

Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:

Seal and clamp flashing to support pipes penetrating roof.

CLEANING AND PROTECTION

Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

Completely remove the plastic film from the pre-finished metal flashing.

END OF SECTION 07620

SECTION 07901 - JOINT SEALANTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

Extent of each form and type of joint sealer is indicated on drawings and schedules.

This Section includes joint sealers for the following locations:

Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:

Joints in unit masonry at flashing intersections.
Joints between different materials.
Other joints as indicated on the Drawings.

SYSTEM PERFORMANCES

Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

SUBMITTALS

Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

QUALITY ASSURANCE

Installer Qualifications: Engage an Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this Project.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PROJECT CONDITIONS

Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F (4.4 deg C).

When joint substrates are wet due to rain, frost, condensation, or other causes.

Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

MATERIALS, GENERAL

Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range standard colors.

ELASTOMERIC JOINT SEALANTS

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.

Products: Subject to compliance with requirements, provide one of the following:

Single Component Nonsag Urethane Sealant:
"Vulkem 116"; Mameco International
"Vulkem 230"; Mameco International
"Sikaflex-1a"; Sika Corporation
"NP-1"; Sonneborn Building Products Div., ChemRex, Inc.

JOINT SEALANT BACKING

General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-15 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS

Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.

Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

EXAMINATION

Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

> Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellant; water; surface dirt; and frost.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces

which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALERS

General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

Do not leave gaps between ends of joint fillers.

Do not stretch, twist, puncture, or tear joint fillers.

Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

Provide flush joint configuration per Figure 6B in ASTM C 962, unless otherwise indicated.
Use masking tape to protect adjacent surfaces of recessed tooled joints.

Provide recessed joint configuration per Figure 6C in ASTM C 962, of recess depth and at locations indicated.

Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where

expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

CLEANING

Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PROTECTION

Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07901

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

RELATED REQUIREMENTS INCLUDED ELSEWHERE

Drawings and general provisions of Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this section.

RELATED TECHNICAL ITEMS:

Air Distribution Systems – Division 15
Light Fixtures – Division 16

SCOPE:

Provide labor, material, equipment and incidentals as required to furnish and install the following:

Acoustical ceiling panel units.

Exposed grid suspension system including, but not necessarily limited to, wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

Additional wires, as required to properly support lighting fixtures, shall be furnished and installed by the electrical work installer under Division 16 - Electrical.

Coordination: Coordinate acoustical ceilings work with installers of related work including, but not necessarily limited to, building insulation, gypsum drywall, mechanical systems, and electrical systems.

SUBSTITUTIONS:

Comply with Product Substitution: Section 00100 Instructions to Bidders. The manufacturer’s products shown in this section are for design and quality standards. Other manufacturers shown to be equal will be considered for acceptance.

REFERENCES:

ASTM A366 "Standard Specification for Steel, Carbon Cold-Rolled Sheet, Commercial Quality."

ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."

ASTM C423 "Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method."

ASTM C635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings."

ASTM C636 "Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels."

ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials."

ASTM E413 "Standard Classification for Determination of Sound Transmission Class."

FS SS-S-118B "Sound Controlling (Acoustical) Tiles and Panels," or ASTM E1264 "Standard Classification for Acoustical Ceiling Products."

SUBMITTALS:

Product Data: Manufacturer's technical literature and installation instructions.

Samples: Minimum 6" x 6" samples of specified acoustical panel; 1'-0" long samples of exposed wall molding and suspension system, including main runner and 4' cross tees.

Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

QUALITY ASSURANCE:

Single Source Responsibility: To insure proper interface and color match, all acoustical panel units and grid components should be produced or supplied by a single manufacturer. Materials supplied by more than one manufacturer are not permissible, unless approved by the Architect.

ENVIRONMENTAL REQUIREMENTS:

The building shall be enclosed; the air conditioning system shall be operating with proper filters in place; and the proper temperature and humidity conditions shall be stabilized before, during, and following installation until Substantial Completion. Building areas to receive ceilings shall be free of construction dust and debris.

EXTRA MATERIALS:

Provide extra acoustical ceiling system materials in unopened, clearly marked cartons equivalent to 2% of the total quantity of installed acoustical panel material and 12 pieces each of 4'-0" long tees and 2'-0" long tees.

DELIVERY, STORAGE, AND HANDLING:

Prior to their installation, allow acoustical panel units to reach room temperature and have a stabilized moisture content within the acoustical panel unit manufacturer's recommended limitations.

Deliver materials in manufacturer's unopened packages; suitably store to protect against exposure to moisture, sunlight, surface contamination, and other unacceptable conditions.

Handle components to prevent panel edge damage or any other damage to components.

PART 2 - PRODUCTS

SUSPENSION SYSTEM:

Product/Manufacturer: Grid; Armstrong World Industries, Inc., U.S.G. or Celotex.

Type 1: 15/16” Grid

Components: All grid components electrogalvanized and hot dipped galvanized, then protective conversion-coated. Tees are double-web steel (conforming to ASTM A653) construction for direct hung installation.

Structural Classification: Intermediate duty.

Web height on main runner shall be 1-1/2" and 1” on cross tee. Each exposed bottom flange shall be continuous with unbroken roll-formed cap, made from galvanized steel, running the length of the member.

Wall moldings shall be “L” molding manufactured by Armstrong World Industries, Inc., and have a nominal 15/16" exposed flange, made from .019" nominal galvanized steel, finished to match grid.

If a fire rated assembly is required, main runner shall have thermal expansion relief details conforming to UL-approved time design ratings, and web ends shall be die-formed to provide for thermal expansion.

Hanger wire shall be galvanized carbon steel per ASTM A641, soft temper, prestretched, with a yield stress load of at least 3 times design load, but not less than 12 gauge (0.106") diameter.

Finish: All steel roll-formed parts, including cap, shall be chemically cleansed, electrogalvanized, and protective-conversion coated. All exposed surfaces, except aluminum, shall then receive a baked polyester finish. All aluminum caps shall be etched and receive a lacquer finish.

Color shall be white and match the actual color of the selected ceiling tile, unless otherwise specified.

ACOUSTICAL PRODUCTS:

Type 1: Provide in all areas unless another type is indicated.

Manufacturer: Armstrong World Industries, Inc.; U.S.G.; or Celotex

Design, Pattern, and Item No.: Fine Fissured, 15/16” Square Lay-In Medium Texture

Performance Characteristics:

Sound Control:

Noise Reduction Coefficient: NRC range of 0.55 in compliance with ASTM C423.

Ceiling Attenuation Class: CAC range of 30 in compliance with ASTM E1414.

Flame Spread:

0-25, per ASTM E84.

Class A, per FS SS-S-118B, or ASTM E1264.

Minimum Light Reflectance 0.82

Sag/Humidity Resistance: HumiGuard Plus

Minimum R-value 1.5

Size and Edges:

Fine Fissured, 15/16” Square Lay-In Medium Texture, #1728 - 24” x 24” x 5/8”

Fine Fissures, 15/16” Square Lay-In Medium Texture. #1729 - 24” x 48” x 5/8”

Partial panels as needed for grid layout plans, but not less than one-half full size.

Type 2: Provide only for kitchen, high humidity areas or where indicated.

Manufacturer: Armstrong World Industries, Inc.; U.S.G.; or Celotex

Design, Pattern, and Item No.: Kitchen Zone, 15/16” Square Lay-In Smooth Texture

Performance Characteristics:

Sound Control:

Noise Reduction Coefficient: Not Applicable.

Ceiling Attenuation Class: CAC range of 33 in compliance with ASTM E1414.

Flame Spread:

0-25, per ASTM E84.

Class A, per FS SS-S-118B, or ASTM E1264.

Minimum Light Reflectance 0.83

Sag/Humidity Resistance: HumiGuard Plus

Minimum R-value 1.6

Size and Edges:

Kitchen Zone, 15/16” Square Lay-In Smooth Texture, #673 - 24” x 24” x 5/8”

Partial panels as needed for grid layout, but not less than one-half full size.

PART 3 - EXECUTION:

PREPARATION:

Do not proceed with installation until all wet work such as concrete, terrazzo, plastering, and painting has

been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

INSTALLATION:

General: All acoustical materials and suspension systems shall be installed in strict accordance with the manufacturer's printed instructions and current recommendations, and in compliance with ASTM C636 and the governing code of jurisdiction.

Deflection of any grid components shall not exceed 1/360 of the span.

Suspend main runners from overhead construction with 12 gauge hanger wires spaced 4'-0" on center along the length of the main runner. Hanger wires shall be plumb and straight.

Install wall moldings at intersection of suspended ceiling and all vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

For regular or reveal edge panels: Cut and reveal or rabbet edges of ceiling tiles at all border areas and vertical surfaces.

Kitchen Zone Type tile to be installed in kitchen areas as noted on the plans. Fissure Tile to be installed in remaining areas as noted on the plans.

ADJUST AND CLEAN:

Clean acoustical ceilings, including trim, edge moldings, and suspension members pursuant to manufacturer's recommendations. Remove and replace damaged components which cannot be successfully restored.

END OF SECTION 09510

SECTION 09910 - PAINTING

PART 1 - GENERAL

RELATED REQUIREMENTS INCLUDED ELSEWHERE

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

Related technical items include but are not limited to the following:

Section 09910 - Painting schedule
Finish schedule – Match Existing Color & Type of Paint
Section 06320 - Product substitutions – Prior Approvals
Mechanical / Electrical – Items to be Painted

SCOPE OF WORK

The work to be done by the painting contractor shall include the furnishing of all materials, labor, tools, and equipment required to complete the painting and decorating of the building(s) as specified. The contractor that performs this work shall be fully responsible for having his equipment comply with current OSHA regulations, and to have available all Material Safety Data sheets that pertain to the products used. The submission of a bid by this contract confirms an understanding of all conditions pertaining to this work and proper application of materials specified.

At location of removed ceiling mounted fan coil units, paint wall from corner to corner by matching the existing color & paint type of the adjacent wall. See plans.

All finish and staining of new cabinetry & casework to match existing adjacent cabinetry & casework at location of demolished fan coil units. See plans.

WORK NOT INCLUDED, UNLESS OTHERWISE SPECIFIED:

Aluminum, copper, brass, bronze, stainless steel, or nickel surfaces.

Shop coating on steel doors, door and window sash and frames, structural steel and fittings.

Pre-finished wall, ceiling and floor coverings.

Baked enamel doors, frames, rails or partitions.

Face brick.

Concealed items, unless specifically called for to be painted.

Code required labels (Example: "UL").

WORKMANSHIP

All materials shall be applied free from runs, sags, wrinkles, streaks, shiners, and brush marks.

All materials shall be applied uniformly. If any reduction of the coating's viscosity is necessary, it shall

be done in accordance with the manufacturer's label directions.

New plaster and other masonry surfaces shall not be primed until it has been determined that these substrates have dried sufficiently to safely accept paint. A reliable electronic moisture meter should be used to make this determination. Unacceptable moisture content should be reported to the architect or his representative.

No exterior painting shall be undertaken if air or surface temperature is below 50°F, nor immediately following rain or until frost, dew, or condensation has evaporated. Surfaces should always be tested with moisture meter before proceeding.

A minimum interior temperature of 65°F shall be maintained during the actual application and drying of the paint, and until occupancy of the building occurs. Adequate ventilation shall be maintained at all times to control excessive humidity which will adversely affect the curing of coatings. The General Contractor is solely responsible for maintaining suitable temperature and ventilation.

Before painting begins, all other crafts shall have completed their work, and shall have removed all dirt and debris resulting therefrom. The rooms or areas are to be left in broom clean condition.

Enamel and varnish undercoats are to be sanded smooth prior to recoating. Tops and bottoms of doors are to be finished in same manner as door facing, after the carpenters complete filling of them.

MATERIALS:

Bids are to be based on coatings as manufactured by Benjamin Moore & Co., Sherwin Williams or TNEMEC, except as otherwise specified. Requests for changes or variations must be made by the contractor in writing, stating reasons with detailed extra costs or savings per hour of labor and/or per gallon of material, for approval by the architect prior to the award of the contract. See Section 00 63 20 – Product Options - Prior Approvals.

Colors shall be those approved by the architect. A duplicate color chipped schedule will be supplied to the painting contractor. All primers and undercoats are to be tinted to the approximate shade of the selected finish coat. Where the color schedule calls for the use of DEEPTONES (interior or exterior), it is the responsibility of the painting contractor to utilize the appropriate Deep Base Primers for use on the surfaces for which they are intended.

The architect reserves the right to take a representative sample of any materials the painting contractor brings on the job and have it tested by an approved testing laboratory to verify that the materials conform to the specification set forth herein. Cost of test, if required, shall be borne by the painting contractor.

All paint and coatings must be delivered to the job site in manufacturer's original containers.

The contractor shall prepare proper size acceptable samples of each color and sheen required for approval by the project architect.

It is to be understood by the general contractor and the painting contractor that all coatings must conform to all state and local regulations including VOC/VOS rules at the time of application.

Lead/Mercury - the contractor shall not use paints formulated with these materials. If the architect references a product that contains one of these materials, the contractor shall notify the architect in writing.

Contractor is wholly responsible for compatibility and bonding of all materials including application to both new and existing surfaces.

PREPARATION OF SURFACES:

The contractor shall be wholly responsible for the quality of his work, and is not to commence any part of it until surface is in proper condition.

If the contractor considers a surface unsuitable for proper finishing, he is to notify the architect of this fact in writing. He is not to apply any material until corrective measures have been taken, or the architect has instructed him to proceed.

All surfaces are to be clean. If for any reason the surface cannot be cleaned, this condition shall be promptly reported to the architect.

If the painting contractor has been instructed by the General Contractor to begin painting under conditions and circumstances he believes could result in poor performance and early failure of the coatings, he shall request the architect for a decision in writing.
The prime coat should be applied soon after surface preparation has been completed, to prevent contamination of the substrate.

EXTRA WORK:

Payment for work over the amount agreed upon in the contract will not be allowed to the contractor unless authorized in writing by the architect.

STORAGE:

The Contractor will provide for a secure space for the storage of all painting materials and equipment, for the exclusive use of the painting contractor. He will be responsible to maintain and leave it free from fire hazards relating to improperly stored rags or thinners.

INSPECTION:

Any work not conforming to the specifications or not meeting the approval of the architect shall be removed or corrected and/or repainted as approved by the architect.

REMOVAL:

Upon completion of a room or area, it shall be left in a clean and orderly condition, and all paint spatters, contaminated rags, and trash shall be removed.

Upon completion of the job, the contractor is to remove all surplus materials, scaffolds, etc., that relate to his trade, from the premises. He shall clean all window glass free of excess paint and spatters, and remove paint that has been misplaced on other surfaces.

PAINT REMOVAL/DISPOSAL:

When the removal of paint containing lead or mercury is required, the contractor is responsible for complying with federal, state and local laws and regulations concerning abatement.

In particular:

Louisiana Revised Statutes of 1950 (R.S. 30:2351-2351.60) Chapter 15-A Lead Hazard Reduction, Licensure and Certification.

U.S. Department of Labor OSHA regulation 29CFR Part 1926 Lead Exposure in Construction; Interim Final Rule

EXTRA MATERIALS:

The contractor shall provide two unopened gallon of paint of each type and color specified for the Owner's use upon completion of the project. Deliver to the Owners representative prior to close-out.

PART 2 - PRODUCTS: (Not Applicable) See Section 09910

PART 3 - EXECUTION:

INTERIOR SURFACES - NEW CONSTRUCTION:

Wood, to be painted:

All surfaces shall be dry and sanded smooth, free of loose dirt, dust and oil.

Putty all nail holes, cracks, and blemishes after undercoater has been applied. Knots are to be coated with SPS or QD 30 before overall coat of enamel underbody is applied.

All coats must be thoroughly dry before applying succeeding coats, and lightly sanded between coats.

Avoid general use of shellac as an undercoat.

After fitting by the carpenter, top and bottom of all doors must be primed with the same as the face of the doors.

Wood, to be stained; Natural Wood (clear finish):

All surfaces shall be dry and sanded smooth, free of loose dirt, dust or grit.

Fill all nail holes, cracks, and blemishes after staining with filler tinted to match the color of the wood or stain.

After fitting by the carpenter, top and bottom of all doors must be sealed with a clear coating.

INTERIOR SURFACES - PREVIOUSLY PAINTED SURFACES:

Wood, to be painted (Doors, trim, cabinets, plywood, paneling):

Surfaces must be clean and free of wax, grease, and water-soluble materials.

Glossy surfaces should be dulled by sanding. Do not use liquid deglossers on surfaces to be topcoated with latex enamels.

Remove loose or scaling paint by scraping and sanding. Repair holes, crevices, and cracks with appropriate patching compound.

Surfaces that have been defaced with marking pens, crayons, lipsticks, etc., should be washed with solvents, then spot primed with SPS or QD 30 to control residual "bleeding."

Scarred or chipped spots should be aggressively sanded so as to feather them flush with the surface.

Wood, Clear Finish (Doors, trim, cabinets, paneling):

Surfaces that have been treated with wax or oily surface restoration compounds must be aggressively cleaned with appropriate solvents. Periodically change to clean wiping cloths to prevent redistribution of waxy or oily residue.
All flaking or scaling must be removed by scraping and sanding with #00 sandpaper.

All standing surfaces that are in good restoration condition should be dulled with fine steel wool and wiped clean with a tack rag before coating.

Plaster and Drywall, Walls and Ceilings:

Remove all peeling or scaling paint by scraping. Sand areas thoroughly to feather edges smooth with adjacent surface.

Cracks, holes and blemished areas are to be filled and sanded flush with adjacent surfaces, then spot primed with finish coating.

Surfaces that have been defaced with marking pens, crayons, lipsticks, etc., should be washed with solvents, then spot primed with SPS or QD 30 to control residual "bleeding."

Walls and ceiling in kitchens and bathrooms are to be thoroughly washed with a detergent solution.

Glossy surfaces should be dulled by sanding lightly with #00 sandpaper.

Ceilings or walls that exhibit water stains are to be sealed with SPS or QD 30.

Masonry, Poured/Precast Concrete, Cement/Cinderblock Walls:

Remove all peeling and scaling paint by scraping and sanding.

All surfaces must be free from greasy and oily deposits. Structural cracks and holes should be filled with appropriate patching compound, then spot primed with finish coating.

Glossy surfaces should be dulled by sanding lightly with #00 sandpaper.

Surfaces that have been defaced with marking pens, crayons, lipsticks, etc., should be washed with solvents, then spot primed with SPS or QD 30 to control residual "bleeding."

END OF SECTION 09910

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Sleeves.
4. Escutcheons.
5. Mechanical demolition.
6. Equipment installation requirements common to equipment sections.
7. Painting and finishing.
8. Concrete bases.
9. Supports and anchorages.
10. Motor starters.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete in every respect and ready for the intended use, as applicable in each instance.

I. Wiring: the term "wiring" shall include providing raceway, conductors, and cable in accordance with the requirements of Division 16.

J. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

K. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.

B. Coordination Drawings: Submit, as soon as feasible after award of contract, equipment room and exterior equipment layouts at a scale not less than 1/4 inch = 1 foot showing the layout of the actual equipment to be used. Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the work.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

C. Equipment Selection: Equipment of higher electrical characteristics, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are appropriately modified. The Contractor will be responsible for any added costs for

such modifications. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

D. Drawings: The Mechanical drawings show the general arrangement of piping, equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit. The Mechanical work shall conform to the requirements shown on all the drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall investigate the structural and finish conditions and other building components affecting the work and shall arrange his work accordingly, providing such offsets, fittings, and accessories as may be required to meet such conditions. No extras will be approved for required additional offsets and fittings. Any offsets or additional fittings required to coordinate mechanical systems with existing conditions and other trades, or that are necessary for the complete installation of the system, including modifications to shop or off-site fabricated piping and/or ductwork, all shall be provided by the Contractor at no additional cost to the Owner.

E. Codes and Standards: comply with the following codes. Comply with the latest edition except where indicated otherwise or a specific edition is required by the authority having jurisdiction:

1. International Building Code.
2. International Fuel Gas Code.
3. International Mechanical Code.
4. International Plumbing Code with Louisiana Amendments.
5. NFPA 54, 70, 90A, 90B, and 101.
6. All applicable local codes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 COORDINATION

A. Coordinate mechanical equipment installation with other building components and existing conditions.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and other concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by firms regularly engaged in the manufacture of products required, whose products have been in satisfactory use in similar service.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8 inch (3.2 mm) maximum thickness unless thickness or specific material is indicated.

    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BAg1, silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, flanged, solder-joint, plain, or weld-neck end connections that match piping system materials and isolate joined dissimilar metals to prevent galvanic action and stop corrosion.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig (2070 kPa) minimum working pressure at 225 degrees F (107 degrees C).

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239 inch (0.6 mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Split-Plate, Stamped-Steel Type: With concealed hinge, spring clips, and chrome-plated finish.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000 psi (34.5 MPa), 28 day compressive strength.
3. Packaging: Premixed and factory packaged.

2.8 MOTOR STARTERS

A. Square D TeSys D-Line, General Electric CR300-Line, or approved equivalent (except where reduced voltage type are specified) with overload protection in each phase (with correctly sized heaters) in NEMA Type I enclosure unless noted otherwise, reset button in cover, and all of the same manufacturer. Provide auxiliary contacts for interlocking where required. Coordinate auxiliary contact needs with Division 15 Section 15971, "Building Management and Control Systems." Include HOA switch and pilot light in cover. Provide control power step-down transformer with sufficient additional capacity to handle essential control requirements (coordinate with Division 15 Section 15971, "Building Management and Control Systems").

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material. Equipment to Be Removed: Disconnect and cap services and remove equipment.
3. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
4. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

B. If pipe, to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

F. Install couplings according to manufacturer's written instructions.

G. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

H. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

I. Install all buried water piping, regardless of content, a minimum of 12 inches below and 12 inches laterally from any buried electrical line. Whether in conduit or direct buried cable, this requirement shall apply regardless of voltage of the electrical line.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

K. Install piping to permit valve servicing.

L. Install piping at indicated slopes.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Pulled-tee, extruded-tee, thread-o-let, weld-o-let, and mitered elbow connections are not acceptable unless specifically indicated otherwise. Provide manufactured tee and elbow fittings.

P. Install tees with removable threaded cleanout plugs at each change in direction in all condensate drain piping.

Q. Select system components with pressure rating equal to or greater than system operating pressure.

R. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: Cast-brass type with chrome-plated finish, split-casing for existing piping, and one-piece for new piping.

c. Insulated and Bare Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
d. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

S. Sleeves are not required for core-drilled holes in masonry or concrete walls.

T. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

U. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4 inch (6.4 mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating interior walls.

3. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.

V. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1 inch (25 mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.

W. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

X. Verify final equipment locations for roughing-in.

Y. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements, Division 15 Sections, and Schedules on the Drawings, specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Manufacturer's Installation and Operating Instructions: All equipment and material shall be installed and operated in strict accord with manufacturer's "Installation and Operating Instructions." The manufacturer's installation instructions shall become part of this Specification, and shall take precedence over and/or supplement any Specification herein and as shown and/or described on Plans. All individual items of equipment and components thereof shall be 100 percent accessible for repair, removal, or replacement without functional impairment or dismantling of any adjoining major surfaces or assemblies.

B. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment to allow right of way for piping installed at required slope.

F. Cut and drill floors, roofs, walls, partitions, ceilings, and other surfaces as required to permit installation of mechanical piping, ducts, and equipment. Perform cutting by skilled mechanics of trades involved. 24-hour notice to Owner must be given before hammer drilling, coring, etc. (noise) to owner.

G. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

H. Electrical Work: Wherever equipment requiring electrical power connection is specified, all wiring shall be furnished and installed under Division 16 of the Specifications. Motor starters, starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various Division 15 Sections, and installed and electrically connected complete under Division 16 unless otherwise specifically noted, except that control devices that are installed in or on ducts, piping, or mechanical equipment shall be mounted under Division 15. If equipment is furnished requiring power wiring different

from that indicated on the electrical drawings, the Contractor furnishing the equipment shall be responsible for any required revisions and pay any additional costs connected therewith. Wiring revisions shall be submitted to the Architect for approval prior to installation.

1. Motor starters shall be provided for each poly phase motor and for single phase motors requiring automatic control. See motor control center schedule on electrical drawings for starters that will be provided under Division 16. Additional disconnects required by the National Electrical Code shall be furnished, installed, and connected under Division 16 of the Specifications.
2. Contractors furnishing items to be wired shall provide adequate wiring diagrams.
3. Temperature control wiring shall be furnished and installed in raceway under Division 15 according to the requirements of Division 16, specifically Section 16120, "Conductors and Cables," and Section 16130, "Raceways and Boxes."

3.6 PAINTING

A. Touching Up: Provide cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.7 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases 8 inches thick, of dimensions indicated, but not less than 6 inches (100 mm) larger in both directions than supported unit.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
4. Use 3000 psi (20.7 MPa), 28 day compressive-strength concrete and reinforcement as follows:

    a. Reinforcing bars: ASTM A 615/A 615M, Grade 60; deformed.
    b. Number 5 bars, top and bottom at 12 inches o.c. each way.

END OF SECTION 15050

SECTION 15055 - MOTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes basic requirements for factory-installed and field-installed motors.

B. Related Sections include the following:

1. Division 15 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.3 SUBMITTALS

A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Operation and Maintenance Data: For field-installed motors to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:

1. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
2. Matched to torque and horsepower requirements of the load.
3. Matched to ratings and characteristics of supply circuit and required control sequence.

PART 2 - PRODUCTS

2.1 MOTOR CHARACTERISTICS

A. Motors 1/2 HP and Larger: Three phase.

B. Motors Smaller Than 1/2 HP: Single phase.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Duty: Continuous duty at ambient temperature of 105 degrees F (40 degrees C) and at altitude of 3300 feet (1005 meters) above sea level.

F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

G. Enclosure: Open dripproof, unless otherwise indicated.

2.2 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Energy-Efficient Design: All motors.

1. Comply with Louisiana Energy Code.
2. Comply with EPACT.
3. Premium efficiency design.
4. High power factor.

C. Stator: Copper windings, unless otherwise indicated.

1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F, unless otherwise indicated.

2.3 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Designed with critical vibration frequencies outside operating range of controller output.
2. Temperature Rise: Matched to rating for Class B insulation.
3. Insulation: Class H.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
5. Comply with MG1-31.
6. Conductors: Shielded, XLP, Omnicable ULTC or equal.

2.4 SINGLE-PHASE MOTORS

A. Type: One of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.

B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

PART 3 - EXECUTION

3.1 MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
2. Test interlocks and control features for proper operation.
3. Verify that current in each phase is within nameplate rating.

3.3 CLEANING

A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 15055

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical system piping and equipment.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

B. Welding Certificates: Copies of certificates for welding procedures and operators.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Firms regularly engaged in manufacture of supports and hangers, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

1. Nonmetallic Coatings: On hangers for electrolytic protection where hangers are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).

D. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 degrees F (49 to 232 degrees C) piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

E. Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

H. Thermal-Hanger Shield Inserts:

1. Description: 100 psig (690 kPa) minimum, compressive-strength insulation insert encased in sheet metal shield.

2. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
3. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
4. For Hangers and Clamped Systems: Insert and shield shall cover entire circumference of pipe.
5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

3.2 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. All hangers for equipment and piping are to be supported from building structure even if structural enhancements to roof support is required.

B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

C. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," are not exceeded.

H. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

I. Support vertical piping at each floor and roof.

J. Insulated Piping: Comply with the following:

1. All hangers and supports shall be external of insulation.
2. Install MSS SP-58, Type 40 protective shields on all insulated piping. Shields shall span arc of 180 degrees.
3. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

C. Any vertical structural members required to form overhead attachments for hangers or equipment supports shall be located adjacent to walls and any horizontal members be adjacent to the roof structure.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION 15060

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment nameplates.
2. Equipment markers.
3. Pipe markers.
4. Valve tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.5 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

1. Data:

    a. Manufacturer, product name, model number, and serial number.
    b. Capacity, operating and power characteristics, and essential data.
    c. Labels of tested compliances.

2. Location: Accessible and visible.
3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.

1. Terminology: Match schedules as closely as possible.
2. Data:

    a. Name and number as indicated on plans.
    b. Equipment service (area served).

3. Size: 4-1/2 by 6 inches (115 by 150 mm) for equipment (chillers, pumps, air units).

C. Access Panel and Door Markers: 1/16 inch (1.6 mm) thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification.

1. Fasteners: Contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Pre-printed, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
3. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pre-Tensioned Pipe Markers: Pre-coiled, semi-rigid, plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

1. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4 inch (6.4 mm) letters for piping system abbreviation. Provide 5/32 inch (4 mm) hole for fastener.

1. Material: 0.032 inch (0.8 mm) thick brass.
2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:

1. Penthouse Air Handling Units
2. Air Terminal Units
3. Packaged Rooftop Units

B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment.

1. Letter Size: 1/2 inch (13 mm).
2. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

    a. Air Handling Units
    b. Air Terminal Units

C. Install access panel markers on equipment access panels.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow. Use size to ensure a tight fit.

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 5 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves.

B. Valve-Tag Size and Shape:

1. Cold Water: 1-1/2 inches (38 mm) round.
2. Hot Water: 1-1/2 inches (38 mm) round.
3. Gas: 1-1/2 inches (38 mm) round.

3.5 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.6 CLEANING

A. Clean faces of mechanical identification devices.

END OF SECTION 15075

SECTION 15081 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, exposed supply and return.

B. Related Sections:

1. Section "Pipe Insulation for Plumbing and HVAC."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; SOFTR All-Service Duct Wrap.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
   b. Eagle Bridges - Marathon Industries; 550.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
   d. Mon-Eco Industries, Inc.; 55-50.
   e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
   b. Eagle Bridges - Marathon Industries; 405.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
   d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.6 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for ducts.

1. Products: Subject to compliance with requirements, provide the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
b. Vimasco Corporation; Elastafab 894.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. Self-Adhesive Outdoor Jacket: 60-mil- (1.5-mm-) thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.

1. Products: Subject to compliance with requirements, provide the following:

a. Polyguard Products, Inc.; Alumaguard 60.

2.8 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.

5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 488 AWF.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
c. Compac Corporation; 120.
d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.9 SECUREMENTS

A. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
2) GEMCO; Perforated Base.
3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
c. Spindle: Stainless steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) GEMCO; Nylon Hangers.

2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch (0.76 mm) thick by 1-1/2 inches (38 mm) in diameter.
c. Spindle: Nylon, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches (63 mm).
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
2) GEMCO; Peel & Press.
3) Midwest Fasteners, Inc.; Self Stick.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
c. Spindle: Stainless steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) GEMCO.
2) Midwest Fasteners, Inc.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. C & F Wire.

2.10 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation,

install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

1. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems" for firestopping and fire-resistive joint sealers.

3.4 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.

f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

   a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
   b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not overcompress insulation during installation.
   e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.5 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.7 FINISHES

A. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

B. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

C. Concealed, Outdoor-Air Duct and Plenum Insulation: Mineral-fiber blanket 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

D. Exposed, Supply-Air Duct and Plenum Insulation: Mineral-fiber board, 3 inches (75 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

E. Exposed, Return-Air Duct and Plenum Insulation: Mineral-fiber board, 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

F. Exposed, Outdoor-Air Duct and Plenum Insulation: Mineral-fiber board, 2 inches (50 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

3.11 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

B. Exposed, Supply-Air Duct and Plenum Insulation: Mineral-fiber board, 3 inches (75 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

C. Exposed, Return-Air Duct and Plenum Insulation: Mineral-fiber board, 3 inches (75 mm) thick and 1.5-lb/cu. ft. (24-kg/cu. m) nominal density.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. None.

3.13 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Exposed:

1. Self-Adhesive outdoor jacket.

END OF SECTION

SECTION 15170 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping for drain lines and condensate drain piping.

B. Related Sections include the following:

1. Division 15 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," for general piping materials and installation requirements.
2. Division 15 Section, "Hangers and Supports for Plumbing and HVAC," for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.

1.3 COORDINATION

A. Coordinate layout and installation of drain piping and suspension system components with other construction, including natural gas piping system.

B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. General: Refer to Piping and Fitting Material Schedule on the Drawings for applications of pipe and fitting materials.

PART 3 - EXECUTION

3.1 PIPING INSTALLATIONS

A. Refer to Division 15 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," for basic piping installation requirements.

B. Install drains, consisting of a tee fitting, threaded nipple with threaded cap for system cleanout. Provide cleanout at each change in direction and at connection to unit.

C. Install piping at a uniform grade of 0.2 percent downward in direction of flow.

D. Increase/reduce pipe sizes using eccentric reducer fitting installed with level side down.

E. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe.

3.2 HANGERS AND SUPPORTS

A. Supports are specified in Division 15 Section, "Hangers and Supports for Plumbing and HVAC."

B. Install supports for steel piping with the following maximum spacing and with continuous slope from unit connection to drain line termination.

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 meters).
2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 meters).
3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 meters).
4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 meters).
5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 meters).
6. NPS 3 (DN 80): Maximum span, 10 feet (3 meters).

3.3 PIPE JOINT CONSTRUCTION

A. Refer to Division 15 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and schedule on the Drawings for joint construction requirements for soldered and brazed joints in copper tubing.

3.4 TERMINAL EQUIPMENT CONNECTIONS

A. Size for piping connections shall be same as for equipment connections. Increase pipe size at connection as indicated on Drawings.

3.5 CLEANING

A. Flush drain piping systems with clean water.

END OF SECTION 15170

SECTION 15183 REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 15739 “Split System Heat Pump Units.”

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction (Vapor) Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
2. Liquid Lines: 535 psig (3689 kPa).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.
2. Solenoid valves.
3. Filter dryers.
4. Strainers.
5. Pressure-regulating valves.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Shop Drawing Scale: 1/4 inch equals 1 foot (1:50).
2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.8 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.9 COORDINATION

A. Coordinate size and location of concrete pads and, equipment supports.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

G. Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
2. End Connections:

    a. NPS 2 (DN 50) and Smaller: With threaded-end connections.
    b. NPS 2-1/2 (DN 65) and Larger: With flanged-end connections.

3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 VALVES AND SPECIALTIES

A. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig (3450 kPa).

B. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24-V ac coil.
6. Working Pressure Rating: 400 psig (2760 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).
8. Manual operator.

C. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.

3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig (3450 kPa).
5. Maximum Operating Temperature: 275 deg F (135 deg C).

D. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

E. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig (14 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 240 deg F (116 deg C).
10. Locking mechanism to prevent huffing.

2.3 REFRIGERANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines NPS 4 (DN 100) and Smaller for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with soldered joints.

B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed.

C. Safety-Relief-Valve Discharge Piping: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

B. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

C. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

D. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

E. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

F. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:

1. Solenoid valves.
2. Thermostatic expansion valves.
3. Hot-gas bypass valves.
4. Compressor.

G. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

H. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels if valves or equipment requiring maintenance is concealed behind finished surfaces.

L. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

M. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

N. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

O. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 15050 - Basic Mechanical Material and Methods.

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

F. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.

G. Welded Joints: Construct joints according to AWS D10.12/D10.12M.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 15060 "Hangers and Supports for Plumbing and HVAC."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).
3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).
4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 15183

SECTION 15194 - FUEL GAS PIPING

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. Extent of natural gas piping system work is indicated on Drawings and Schedules and by requirements of this Section.

B. Applications for natural gas piping systems include the following:

1. Gas service from street main or main on site to building meter.
2. Building distribution system from gas meter to gas-fired equipment connections.

C. Trenching and backfill required in conjunction with gas service piping is specified in applicable Division 15 Sections, and is included as work of this Section.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of natural gas piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.

B. Comply with NFPA 54 “National Fuel Gas Code” and International Fuel Gas Code for gas piping materials and components; installations; and inspection, testing, and purging.

C. Local Utility Compliance: Comply with requirements of serving utility company.

D. Local and State Codes: Comply with governing code and State Fire Marshal requirements.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s data for gas piping systems materials and products.

PART 2 – PRODUCTS

2.1 NATURAL GAS PIPING MATERIALS AND PRODUCTS

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of

materials which match pipe materials used in natural gas piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION

A. General: Provide identification complying with Division 15 Section, "Mechanical Identification for Plumbing and HVAC," in accordance with the following listing:

1. Gas Service: Underground detectable type plastic line markers.

2.3 BASIC PIPE, TUBE, AND FITTINGS

A. General: Provide pipe, tube, and fittings complying with Division 15 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the Schedule on Drawings.

B. Gas Transition Fittings: Gas transition fittings shall be manufactured steel fittings approved for jointing metallic and thermoplastic pipe. Approved transition fittings are those that conform to AGA-01 requirements for transitions fittings.

C. Risers: A manufacturer's standard transition fitting, transition from plastic to plastic-coated steel pipe with O-ring seals and swaged gas-tight with metal insert. Provide manufacturer's standard protective sleeve.

2.4 BASIC HANGERS AND SUPPORTS

A. General: Provide hangers and supports seals complying with Division 15 Section, "Hangers and Supports for Plumbing and HVAC."

2.5 VALVES

A. General: Valves required for natural gas piping systems include the following types:

1. Gas Cocks:

a. Gas Cocks 2 Inches and Smaller: 150 psi non-shock WOG, bronze straightway cock, flat or square head, threaded ends.
b. Gas Cocks 2-1/2 Inches and Larger: 125 psi non-shock WOG, iron body bronze mounted, straightway cock, square head, flanged ends.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single-stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2 1/2 (DN 65) and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Meter Company.
    b. Fisher Control Valves and Regulators; Division of Emerson Process Management.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon,
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulators.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 100 psig.

PART 3 - EXECUTION

3.1 INSTALLATION OF BASIC IDENTIFICATION

A. General: Install mechanical identification in accordance with Division 15 Section, "Mechanical Identification for Plumbing and HVAC."

3.2 INSTALLATION OF NATURAL GAS PIPING

A. General: Install natural gas distribution piping in accordance with Division 15 Section, "Basic Mechanical Materials and Methods," and in accordance with applicable codes and Center Point Energy Utility Company requirements. The contractor shall include all costs of metering, service lines and connections to Center Point Energy distribution lines in his bid.

B. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation, and retain until continuing piping or equipment connections are completed.

F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

G. Install drip-legs in gas piping where indicated, at equipment connections, and where required by code or regulation.

H. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

I. Use dielectric unions where dissimilar metals are joined together.

J. Install piping with 1 inch drop in 60 degree pipe run (0.14 percent) in direction of flow.

K. Install piping parallel.

L. Do not install gas piping below floor slab or in unventilated concealed spaces. Provide protective metal sleeves for pipes passing through walls, floors, or partitions.

M. Coordinate with gas utility company as necessary to interface gas piping with gas service supply work.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers and supports in accordance with Division 15 Section, "Hangers and Supports for Plumbing and HVAC."

3.4 INSTALLATION OF VALVES

A. Gas Cocks: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.

B. Locate gas cocks where easily accessible and where they will be protected from possible injury.

3.5 EQUIPMENT CONNECTIONS

A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.6 PIPING TESTS

A. Test and purge natural gas piping in accordance with ANSI B31.2, and local utility requirements. Test at not less than 100 p.s.i.g. and prove tight for 2 hours.

B. Repair or replace fuel gas piping as required to eliminate leaks and retest as specified to demonstrate compliance.

3.7 SPARE PARTS

A. Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION

SECTION 15732 - PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1 Section Includes:

A. Packaged rooftop air conditioners designed for cooling and heating.

1.2 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99 - Standards Handbook

C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes

D. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.

E. ANSI/ASHRAE – Standard 34 Designation of Safety Classification of Refrigerants

F. ARI 340/360 - Unitary Large Equipment

G. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality

H. ASHRAE 90.1 - Energy Standard for Buildings Except Low Rise Residential

I. IBC – International Building Code

J. IMC – International Mechanical Code

K. IFGC – International Fuel Gas Code

L. NEMA MG1 - Motors and Generators

M. NFPA 54 - National Fuel Gas Code.

N. NFPA 70 - National Electric Code.

O. NFPA 72 – National Fire Alarm and Signaling Code

P. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems

Q. UL 900 - Test Performance of Air Filter Units.

R. UL 60335-2-40 – Standard for Household and Similar Electrical Appliances – Safety Part 2-40

1.3 RELATED DOCUMENTS

A. Section 15194 - Fuel Gas Piping

B. Section 15170 - Condensate Drain Piping

C. Section 15815 - Metal Ducts

D. Section 15950 - Testing, Adjusting and Balancing

1.4 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.

B. Product Data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
2. Provide computer generated fan curves with specified operating point clearly plotted.
3. Manufacturer's Installation Instructions.

C. Factory Tests

1. Provide copies of factory tests as follows;

a. Refrigerant circuit leak and run tests.
b. Fan assembly run tests.
c. Operation of unit controls.
d. Final Inspection Report.

D. Startup Reports:

1. Provide startup report for each unit. Use manufacturer's standard Startup Form. The installing contractor shall perform the manufacturer's recommended pre-startup checks and a factory authorized service representative shall perform the startup.

1.5 OPERATION AND MAINTANENCE DATA

A. Maintenance Data: Provide instructions for installation, maintenance and service

B. Warranty Certificates

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.

B. Startup must be done by factory authorized service representative.

C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept products on site and inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Lennox

B. Suppliers of equipment other than the "basis of design" shall provide a complete description of equipment including; model numbers, performance data, dimensions, weights, clearances, power requirements, etc., to all bidders.

C. Bidders utilizing equipment other than the basis of design shall include all modifications necessary to incorporate the equipment furnished into the project at no additional cost to the owner. Modifications shall include but are not limited to the following; electrical work, structural framing, condensate piping, fuel gas piping, unit location and orientation due to equipment dimensions, ductwork connections or service clearances.

D. Packaged rooftop units 2000 CFM (5 tons) and smaller.

1. Aaon RN/RNA Series
2. Trane YSK Series
3. Lennox LGT Series
4. Daikin DHG Series (R-32)

E. Packaged rooftop units 2050 to 10000 CFM (6 to 25 tons)

1. Aaon RN/RNA Series
2. Trane YSK Series
3. Lennox LGT Series
4. Daikin DHG Series (R-32)

2.2 Warranty: The manufacturer shall provide the following warranties which shall commence at project substantial completion.

A. Parts only warranties

1. Entire unit – 1 year.
2. Compressors – 5 years
3. Control boards – 3 years
4. Heat exchangers – 15 years
5. Roof curbs – 5 years

B. Labor warranties

1. Compressors – 5 years
2. Control boards – 3 years

2.3 ROOFTOP UNITS

A. Provide as shown on drawings. Unit performance and electrical characteristics shall be per the schedule.

B. Configuration: Fabricate as detailed on drawings:

1. Return plenum
2. Filter section
3. Cooling coil section
4. Supply fan section
5. Gas heating section.
6. Condensing unit section

C. The complete unit shall be UL or cETLus listed.

D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-454B or R-32 Refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.4 CABINET, CASING, AND FRAME

A. Panel construction shall be single-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be foil faced with a minimum R-value of 4. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 2.0 inches w.g.

B. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless-steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

2.5 OUTDOOR/RETURN AIR SECTION

A. Unit shall be provided with an outdoor air hood. The outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream. Outdoor air hood shall be design for 0-25% of unit airflow.

B. Low leakage dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.

C. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the two position type. Damper to open when the supply fan starts, and close when supply fan stops.

2.6 FILTERS

A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2” filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 construction filters. The contractor shall furnish and install, additional sets of filters as required by this section.

2.7 COOLING COIL

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic or thermostatically controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid sub-cooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be non-corrosive and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit.

2.8 HOT GAS REHEAT

A. Unit shall be equipped with a staged hot gas reheat coil with hot gas coming from the unit condenser

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F and have a 15°F temperature rise.

D. Each coil shall be factory leak tested with high-pressure air under water.

2.9 SUPPLY FAN

A. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be direct drive fan mounted to the motor shaft

where available. Belts and sheaves are acceptable only when direct drive is not available due to the additional maintenance.

B. Supply fan shall be one of the following, designed for airflow range of 60-100% of design airflow;

1. Single width, single inlet (SWSI) airfoil centrifugal fan.
2. Double width, double inlet (DWDI) forward curved.
3. Plenum fan.

C. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.

D. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.

E. The fan motor shall be a totally enclosed Electronically Commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

F. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.10 NATURAL GAS HEATING SECTION

A. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.

B. The module shall be complete with furnace controller and control valve capable of a minimum 2 stage operation.

C. The heat exchanger tubes shall be constructed of stainless steel.

D. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.

E. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.

F. The factory-installed unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

2.11 CONDENSING SECTION

A. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25º F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

C. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

D. Provide hail guards for condenser coils.

2.12 COMPRESSORS

A. The unit shall have scroll compressors. One of the compressors shall be an inverter driven or a digital scroll compressor providing proportional control. The unit controller shall control the speed of the compressor (inverter driven) or loaded/unloaded time periods (digital scroll) to maintain the discharge air temperature. Each compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.

B. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

C. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

D. Each circuit shall be dehydrated and factory charged with R-454B or R-32 Refrigerant and oil.

E. Provide locking, tamper resistant caps for refrigerant circuit access ports.

2.13 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory

wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

2.14 ROOF CURBS

A. A prefabricated galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be designed for complete support of the entire unit and all accessories, without any additional equipment supports. The curb shall be a minimum of 14" high or taller if noted on the drawings. Curbs shall include a nominal 2" x 4" wood nailing strip and minimum 1 1/2" thick 3# density rigid fiberglass insulation (minimum R value 6.5) on curb interior. Gasket shall be provided for field mounting between the unit base and roof curb.

B. Provide limp mass sound barrier on top of two (2) layers of 6" un-faced fiberglass BATT insulation. Install BATTs and sound blanket on top of roof deck inside the curb perimeter of each unit. Omit BATTs and sound barrier only where required for down flow ductwork.

1. Sound barrier shall be one of the following or approved equal;

   a. Acoustics First Corp. – Blockaid VSB
   b. Kinetics Noise Control - KNM-100AL

2. Sound barrier shall have the following minimum sound transmission loss performance by frequency band;

125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
13	17	21	28	33	37

2.15 CONTROLS

A. Provide a complete, factory installed, integrated microprocessor based control system to control all unit functions including airflow, temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone controllers shall not be dependent on communications with any on-site or remote PC, BMCS or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature
2. Discharge air temperature
3. Outdoor air temperature
4. Space air temp
5. Dirty filter indication
6. Airflow verification
7. Cooling status
8. Control temperature (Changeover)
9. VAV box output status
10. Cooling status/capacity
11. Unit status
12. All time schedules
13. Active alarms w/time and date
14. Previous alarms with time and date
15. Optimal start
16. System operating hours

    a. Fan
    b. Exhaust fan
    c. Cooling
    d. Individual compressor
    e. Heating
    f. Economizer
    g. Tenant override

G. The user interaction with the keypad shall provide the following setpoints as a minimum:

1. Controls mode

    a. Off manual

b. Auto
c. Heat/cool
d. Cool only
e. Heat only
f. Fan only

2. Occupancy mode

a. Auto
b. Occupied
c. Unoccupied
d. Tenant override

3. Unit operation changeover control

a. Return air temperature
b. Space temperature
c. Network signal

4. Cooling and heating change-over temperature with deadband
5. Cooling discharge air temperature (DAT)
6. Supply reset options

a. Return air temperature
b. Outdoor air temperature
c. Space temperature
d. Airflow (VAV)
e. Network signal
f. External (0-10 vdc)
g. External (0-20mA)

7. Temperature alarm limits

a. High supply air temperature
b. Low supply air temperature
c. High return air temperature

8. Lockout control for compressors
9. Compressor interstage timers
10. Night setback and setup space temperature
11. Building static pressure
12. Economizer changeover

a. Enthalpy
b. Dry bulb temperature

13. Current time and date
14. Tenant override time
15. Occupied/unoccupied time schedule
16. One event schedule
17. Holiday dates and duration

18. Service mode

    a. Timers normal (all time delays normal)
    b. Timers fast (all time delays 20 sec)

H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1. Zone sensor with tenant override switch
2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1. Airflow
2. Outside air temperature
3. Space Temperature
4. Return air temperature
5. External signal of 1-5 VDC
6. External signal of 0-20 mA
7. Network signal

J. Provide manufacturer's standard wall mounted thermostat to adjust temperature and humidity setpoints, time schedule, and occupant over-ride through unit mounted DDC Controller.

K. DDC controller shall be BACnet compatible or provide interface module to connect the factory installed DDC unit controller to a Building Management and Control System provided by the Owner. Assist the owner's BMCS contractor in connecting to the control network, mapping all points, and verify proper operation of units.

1. Interface module shall connect to the BMCS using BACnet and shall be factory installed in the controls compartment adjacent to the DDC controller.

2.16 REFRIGERANT DETECTION SYSTEM

A. Provide sensors, elements, wiring and controls as required to maintain refrigerant concentration below the Detection Threshold Limit Value (DTLV) in accordance with UL 60335-2-40.

2.17 DUCT SMOKE DETECTION (UNITS MORE THAN 2000 CFM)

A. Interlock Direct Digital Control system with duct smoke detectors provided in Division 16 specification section Fire Alarm in accordance with NFPA 70 and NFPA 90A.

1. Install in supply and return ducts. Supply fan and all cooling and heating functions shall be de-energized. Power to DDC unit controls shall not be interrupted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine areas for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Unit Support on roofs: Install units level on roof curbs or supports as indicated in accordance with manufacturer’s instructions. Refer to structural drawings for support framing required for curbs.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at horizontal unit connections.
2. Connect supply ducts to RTUs with flexible duct connectors specified in Section "Ductwork Accessories."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. RTU will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.
7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Verify lubrication on fan and motor bearings.
10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
11. Adjust fan belts to proper alignment and tension.
12. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

13. Inspect and record performance of interlocks and protective devices; verify sequences.
14. Operate unit for an initial period as recommended or required by manufacturer.
15. Calibrate thermostats.
16. Adjust and inspect high-temperature limits.
17. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
18. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
20. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.

b. Return-air volume.
c. Outdoor-air intake volume.

21. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

22. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. Low-temperature safety operation.
    b. Filter high-pressure differential alarm.
    c. Smoke and firestat alarms.

23. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

3.8 EXTRA MATERIALS

A. Provide the following extra materials for each unit at substantial completion or as noted below. The contractor shall obtain a receipt for all items turned over to the owner.

1. Belts: Provide one (1) complete set of belts for each unit with a belt drive motor.
2. Filters: Provide four (4) complete sets.

    a. Install initial set of filters prior to equipment startup.
    b. Install second set of filters prior to Test Adjust and Balance work.
    c. Provide two complete sets of filters to the owner and obtain receipt.

END OF SECTION 15732

SECTION 15735 - 100% OUTSIDE AIR, PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1 Section Includes:

A. Packaged rooftop air conditioners designed for 100% outside air.

1.2 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99 - Standards Handbook

C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes

D. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.

E. ARI 340/360 - Unitary Large Equipment

F. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality

G. ASHRAE 90.1 - Energy Standard for Buildings Except Low Rise Residential

H. IBC – International Building Code

I. IMC – International Mechanical Code

J. IFGC – International Fuel Gas Code

K. NEMA MG1 - Motors and Generators

L. NFPA 54 - National Fuel Gas Code.

M. NFPA 70 - National Electric Code.

N. NFPA 72 – National Fire Alarm and Signaling Code

O. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems

P. UL 900 - Test Performance of Air Filter Units.

Q. UL 60335-2-40 – Standard for Household and similar Electrical Appliances Safety.

1.3 RELATED DOCUMENTS

A. Section 15170 - Condensate Drain Piping

B. Section 15194 - Fuel Gas Piping

C. Section 15815 - Metal Ducts

D. Section 15950 - Testing, Adjusting and Balancing

1.4 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.

B. Product Data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
2. Provide computer generated fan curves with specified operating point clearly plotted.
3. Manufacturer's Installation Instructions.

C. Factory Tests

1. Provide copies of factory tests as follows;

a. Refrigerant circuit leak and run tests.
b. Fan assembly run tests.
c. Operation of unit controls.
d. Final Inspection Report.

D. Startup Reports:

1. Provide startup report for each unit. Use manufacturer's standard Startup Form. The installing contractor shall perform the manufacturer's recommended pre-startup checks and a factory authorized service representative shall perform the startup.

1.5 OPERATION AND MAINTANENCE DATA

A. Maintenance Data: Provide instructions for installation, maintenance and service

B. Warranty Certificates

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.

B. Startup must be done by factory authorized service representative.

C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept products on site and inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: AAON

B. Suppliers of equipment other than the "basis of design" shall provide a complete description of equipment including; model numbers, performance data, dimensions, weights, clearances, power requirements, etc., to all bidders.

C. Bidders utilizing equipment other than the basis of design shall include all modifications necessary to incorporate the equipment furnished into the project at no additional cost to the owner. Modifications shall include but are not limited to the following; electrical work, structural framing, condensate piping, fuel gas piping, unit location and orientation due to equipment dimensions, ductwork connections or service clearances.

D. Outside Air packaged rooftop units less than 5000 CFM

1. AAON - RQ series/RN Series
2. Daikin - Rebel DPS Series
3. Greenheck – RV Series
4. Valent – RX Series

E. Outside Air packaged rooftop units 5000 CFM and larger

1. AAON – RN Series
2. Daikin – Rebel - DPS series

2.2 Warranty: The manufacturer shall provide the following warranties which shall commence at project substantial completion.

A. Parts only warranties

1. Entire unit – 1 year.
2. Compressors – 5 years

3. Control boards – 3 years
4. BMCS interface module – 3 years
5. Gas heat exchangers – 15 years
6. Roof curbs – 5 years

B. Labor warranties

1. Compressors – 5 years
2. Control boards – 3 years

C. Refrigerant warranty

1. Refrigerant and labor – 5 years

2.3 UNITS less than 5000 CFM

A. Provide as shown on drawings. Unit performance and electrical characteristics shall be per the schedule.

B. Configuration: Fabricate as detailed on drawings:

1. Return plenum / economizer section
2. Filter section
3. Exhaust fan section
4. Cooling coil section
5. Supply fan section
6. Gas heating section.
7. Electric heating section
8. Condensing unit section

C. The complete unit shall be UL or cETLus listed.

D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

I. CABINET, CASING, AND FRAME

1. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 2" thick injected foam with a minimum R-value of 13. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.
2. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.
3. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

J. OUTDOOR/RETURN AIR SECTION

1. Unit shall be provided with a 100% outdoor air hood. The 100% outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream.
2. Low leakage dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.
3. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the modulating type. Damper to open when the supply fan starts, and close when supply fan stops.

K. FILTERS

1. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept 2” pleated pre-filter and 4” pleated filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 pre-filter and MERV 14 filters. The contractor shall furnish and install, additional sets of filters as required by this section.

L. EXHAUST FAN (STATIC PRESSURE CONTROL)

1. Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
2. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
3. Exhaust fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.
4. The fan motor shall be a totally enclosed Electronically Commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
5. The unit DDC controller shall provide building static pressure control. The controller shall provide proportional control of the exhaust fan(s) from 25% to 100% of the scheduled supply airflow to maintain the adjustable building pressure setpoint. The fan shall not operate in a state of surge at any point within the modulation range. The pressure controller shall be factory installed. Sensing tubing shall be field installed

M. COOLING COIL

1. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.
2. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
3. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid sub-cooling and the superheat of the refrigerant system.
4. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
5. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

N. HOT GAS REHEAT

1. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser
2. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
3. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil

and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F and have a 20°F temperature rise.

4. Each coil shall be factory leak tested with high-pressure air under water.

O. SUPPLY FAN

1. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
2. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
3. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.
4. The fan motor shall be a totally enclosed Electronically Commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
5. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

P. NATURAL GAS HEATING SECTION

1. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.
2. The module shall be complete with furnace controller and control valve capable of a minimum 3:1 modulating operation.
3. The heat exchanger tubes shall be constructed of stainless steel.
4. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
5. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.
6. The factory-installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

Q. ELECTRIC HEATING SECTION

1. The rooftop unit shall include multi stage electric strip heating coil(s). At least one stage shall be SCR (Silicon Controlled Rectifier) controlled and shall modulate heat output.
2. The factory-installed DDC unit control system shall control all stages of electric heat including SCR stage to control discharge air temperature.

R. CONDENSING SECTION

1. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.
2. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25º F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.
3. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

S. COMPRESSORS

1. The unit shall have scroll compressors. One of the compressors shall be an inverter driven or a digital scroll compressor providing proportional control. The unit controller shall control the speed of the compressor (inverter driven) or loaded/unloaded time periods (digital scroll) to maintain the discharge air temperature. Each compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.
2. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.
3. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.
4. Each circuit shall be dehydrated and factory charged with refrigerant and oil.
5. Provide locking, tamper resistant caps for refrigerant circuit access ports.

T. ELECTRICAL

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.
3. The unit's short circuit current rating [SCCR] shall be as noted on the drawings.

2.4 UNITS 5000 CFM AND LARGER

A. Provide as shown on drawings. Unit performance and electrical characteristics shall be per the schedule.

B. Configuration: Fabricate as detailed on drawings:

1. Return plenum / economizer section
2. Filter section
3. Exhaust fan section
4. Cooling coil section
5. Supply fan section
6. Gas heating section
7. Electric heating section
8. Condensing unit section

C. The complete unit shall be UL or ETL/CETL listed

D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.

E. The burner and gas train for the unit furnace shall be CETL approved.

F. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with refrigerant and oil.

G. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include final balancing of the supply fan assemblies, a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

H. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

I. Performance: All scheduled capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

J. CABINET, CASING, AND FRAME

1. Panel construction shall be double-wall construction for all doors, side panels and ceiling panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a

minimum of 2" thick injected foam with a minimum R-value of 13. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

2. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 750-hour salt spray test without blistering or peeling in accordance with ASTM B117 standard for salt spray resistance when the sample is scribed with an X and sample edges are not protected.
3. Service doors shall be provided on both sides of the mixing box, filter and DX coil sections. An access door shall also be provided to the fan section, heat section and control box in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

K. OUTDOOR / RETURN AIR SECTION

1. Damper blades shall be gasketed with side seals to provide an air leakage rate of no more than 1.5 cfm / square foot of damper area at 1” differential pressure. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers.
2. Unit shall be equipped with a low leak OA damper. OA shall enter the unit through the end of the unit and shall have hoods sized to prevent water carry over during inclement weather. Damper shall be controlled with a modulating, direct coupled actuator to allow for field adjustment of unit airflow. All damper blades shall be low leak, gasketed and also have side and blade seals to provide an air leakage rate of 1.5 cfm/square foot of damper area at 1" differential pressure. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers.

L. FILTERS

1. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept 2” pleated pre-filter and 4” pleated filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 pre-filter and MERV 14 filters. The contractor shall furnish and install, additional sets of filters as required by this section.

M. EXHAUST FAN (BUILDING PRESSURE CONTROL)

1. Exhaust fan shall be a non-overloading, single width, single inlet (SWSI) airfoil centrifugal fan. The fan blade design shall be a double blade with the airfoil geometry, a backward inclined blade fan wheel design will not be acceptable. The fan wheel shall be Class II construction with fan blades welded to the back plate and end rim. The exhaust fan shall be mounted using solid-steel shafts and wheel hubs with mating keyways
2. The fan assembly shall have fixed pitched drives. The drives shall be selected with a minimum diameter of 4 inches and a 1.2 service factor. The belts shall be of the grip-notch design.

3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts. Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide a L-50 life at 250,000 hours. The entire fan assembly shall be isolated from the fan bulkhead with a flexible collar and mounted on 1" spring isolators.
4. Fan motors shall be heavy-duty 1800 rpm open drip-proof (ODP) type with grease lubricated ball bearings. Motors shall be premium efficiency suitable for use with Variable Frequency Drives. Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment. Motors shall be suitable for use with a variable frequency drive.
5. Provide manufacturer's standard Variable Frequency Drive for each exhaust fan. VFDs shall be factory installed and wired inside the RTU.
6. The unit DDC controller shall provide building static pressure control. The controller shall provide speed control of the exhaust fan(s) from 20% to 80% of the scheduled supply airflow to maintain the adjustable building pressure setpoint. The fan shall not operate in a state of surge at any point within the modulation range. The pressure controller shall be factory installed. Sensing tubing shall be field installed

N. COOLING SECTION

1. The direct expansion (DX) coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped stainless steel drain pan with a minimum depth of 2.3" on the connection side.
2. Direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 6 rows for maximum dehumidification effect. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
3. A positively sloped drain pan shall be provided with the cooling coil. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan construction shall be a stainless steel design. The drain pan shall be connected to a threaded drain connection extending through the unit base. Drain pan shall be removable from the side of the unit without the removal of the cooling coil.

O. SUPPLY FAN

1. Supply fan shall be a non-overloading, single width, single inlet (SWSI) airfoil centrifugal fan. The fan blade design shall be a double blade with the airfoil geometry, a backward inclined blade fan wheel design will not be acceptable. The fan wheel shall be Class II construction with fan blades welded to the back plate and end rim. The supply fan shall be mounted using solid-steel shafts and wheel hubs with mating keyways
2. The fan assembly shall have fixed pitched drives. The drives shall be selected with a minimum diameter of 4 inches and a 1.2 service factor. The belts shall be of the grip-notch design.
3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment. All fan assemblies shall employ solid steel fan shafts.

Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide a L-50 life at 250,000 hours. The entire fan assembly shall be isolated from the fan bulkhead with a flexible collar and mounted on 1" spring isolators.

4. Fan motors shall be heavy-duty 1800 rpm open drip-proof (ODP) type with grease lubricated ball bearings. Motors shall be premium efficiency suitable for use with Variable Frequency Drives. Motors shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment. Motors shall be suitable for use with a variable frequency drive.
5. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.
6. Provide manufacturer's standard Variable Frequency Drive for each supply fan. VFDs shall be factory installed and wired inside the RTU.

P. HOT GAS REHEAT

1. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.
2. Hot gas coil shall be all aluminum design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. Each condenser coil shall be factory leak tested with high-pressure air under water.
3. Hot gas coil shall be sized to allow for full condensing across the operation range of the unit. High temperature liquid shall be piped downstream of the unit's condenser coils into the liquid line.
4. The reheat coil volume shall be small enough to not require receivers or any device that reduces sub-cooling. Controls and control valves will automatically cycle operation between normal cooling, dehumidification or reheat modes in response to the field wired, space humidity or dew point sensor without refrigeration safety trips.
5. The hot gas reheat option shall have a fully modulated control to allow for unit leaving air temperature control to +/- 2°F and a 20°F temperature rise.
6. The modulating hot gas reheat systems shall allow for independent control of the DX cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling and reheat leaving air temperature setpoints shall be adjustable through the unit DDC controller.

Q. NATURAL GAS HEATING SECTION

1. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.
2. The module shall be complete with furnace controller and control valve capable of a minimum 3:1 modulating operation.
3. The heat exchanger tubes shall be constructed of stainless steel.
4. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
5. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.

6. The factory-installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

R. ELECTRIC HEATING SECTION

1. The rooftop unit shall include multi stage electric strip heating coil(s). At least one stage shall be SCR (Silicon Controlled Rectifier) controlled and shall modulate heat output.
2. The factory-installed DDC unit control system shall control all stages of electric heat including SCR stage to control discharge air temperature.

S. CONDENSING SECTION

1. Condenser coils shall be all aluminum design, and mounted on polymer brackets, to minimize di-electric corrosion. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. Each condenser coil shall be factory leak tested with high-pressure air under water. Condenser coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating
2. Condenser fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Condenser fan rpm shall be 1140 rpm maximum. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.
3. Each circuit shall have fan cycling of at least one condenser fan to maintain positive head pressure. An ambient thermostat shall prevent the refrigeration system from operating below 47º F.
4. Condenser coils shall be recessed and protected from hail damage as an integral part of the unit design. Hail guards shall be provided on all units with vertical mounted condenser coils.

T. COMPRESSORS

1. Each unit shall have multiple fixed speed scroll compressors and one variable speed inverter driven or digital scroll compressor. All compressors shall be isolated with resilient rubber isolators to decrease noise transmission. The lead compressor shall be driven by variable frequency drive or a digital scroll to control compressor capacity. The compressor speed shall dynamically vary to match the space load. The minimum unit capacity shall be 20% of full load. The variable speed inverter compressor motor shall be a brushless permanent magnet type, to provide higher efficiency at all speeds. Oil injection system shall be provided to ensure optimal efficiencies. Oil pump and strainer shall be provided for each compressor for lubrication at all compressor speeds. Oil Strainer shall be provided to control the risk of system debris in the oil injection circuit. Each variable speed inverter compressor shall be engineered with an appropriately sized VFD to control compressor motor speed and to provide compressor protection functions. Crankcase heating shall be provided (via a DC holding current through the motor windings) to prevent refrigerant migration and mixing with crankcase oil when the compressor is not in operation. Current sensing, motor temperature sensing, and motor overload protection, a time delay to prevent short cycling and simultaneous starting of compressors following a power failure is provided. Each fixed speed compressor shall include crankcase heater, sight-glass, current

sensing and motor temperature sensing, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.

2. Each unit shall have two independent refrigeration circuits for redundancy. Each circuit shall be complete with a low pressure control, filter-drier, liquid moisture indicator/sight-glass, thermal expansion valve, and a manual reset high pressure safety switch. The thermal expansion valve shall be capable of modulation from 100% to 25% of its rated capacity. Sight-glasses shall be accessible for viewing without disrupting unit operation. Each circuit shall be dehydrated and factory charged with refrigerant and oil.
3. Each unit shall have at least 4 compressor stages of cooling capacity control for better part load control.
4. Provide locking, tamper resistant caps for refrigerant circuit access ports.

U. ELECTRICAL

1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.
2. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.
3. The unit's short circuit current rating [SCCR] shall be as noted on the drawings.

2.5 ROOF CURBS (ALL UNIT SIZES)

A. A prefabricated galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be designed for complete support of the entire unit and all accessories, without any additional equipment supports. The curb shall be a minimum of 14" high or taller if noted on the drawings. Curbs shall include a nominal 2" x 4" wood nailing strip and minimum 1 1/2” thick 3# density rigid fiberglass insulation (minimum R value 6.5) on curb interior. Gasket shall be provided for field mounting between the unit base and roof curb.

B. Provide limp mass sound barrier on top of two (2) layers of 6” un-faced fiberglass BATT insulation. Install BATTs and sound blanket on top of roof deck inside the curb perimeter of each unit. Omit BATTs and sound barrier only where required for down flow ductwork.

1. Sound barrier shall be one of the following or approved equal;

   a. Acoustics First Corp. – Blockaid VSB
   b. Kinetics Noise Control - KNM-100AL

2. Sound barrier shall have the following minimum sound transmission loss performance by frequency band;

125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
13	17	21	28	33	37

2.6 CONTROLS (ALL UNIT SIZES)

A. Provide a complete, factory installed, integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including airflow, temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Return air temperature
2. Discharge air temperature
3. Outdoor air temperature
4. Space air temp
5. Dirty filter indication
6. Airflow verification
7. Cooling status

8. Control temperature (Changeover)
9. VAV box output status
10. Cooling status/capacity
11. Unit status
12. All time schedules
13. Active alarms w/time and date
14. Previous alarms with time and date
15. Optimal start
16. System operating hours

    a. Fan
    b. Exhaust fan
    c. Cooling
    d. Individual compressor
    e. Heating
    f. Economizer
    g. Tenant override

G. The user interaction with the keypad shall provide the following setpoints as a minimum:

1. Controls mode

    a. Off manual
    b. Auto
    c. Heat/cool
    d. Cool only
    e. Heat only
    f. Fan only

2. Occupancy mode

    a. Auto
    b. Occupied
    c. Unoccupied
    d. Tenant override

3. Unit operation changeover control

    a. Return air temperature
    b. Space temperature
    c. Network signal

4. Cooling and heating change-over temperature with deadband
5. Cooling discharge air temperature (DAT)
6. Supply reset options

    a. Return air temperature
    b. Outdoor air temperature
    c. Space temperature
    d. Airflow (VAV)
    e. Network signal

f. External (0-10 vdc)
g. External (0-20mA)

7. Temperature alarm limits

   a. High supply air temperature
   b. Low supply air temperature
   c. High return air temperature

8. Lockout control for compressors
9. Compressor interstage timers
10. Night setback and setup space temperature
11. Building static pressure
12. Economizer changeover

    a. Enthalpy
    b. Dry bulb temperature

13. Current time and date
14. Tenant override time
15. Occupied/unoccupied time schedule
16. One event schedule
17. Holiday dates and duration
18. Service mode

    a. Timers normal (all time delays normal)
    b. Timers fast (all time delays 20 sec)

H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1. Zone sensor with tenant override switch
2. Zone sensor with tenant override switch plus heating and cooling set point adjustment. (Space Comfort Control systems only)

I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1. Airflow
2. Outside air temperature
3. Space Temperature
4. Return air temperature
5. External signal of 1-5 VDC
6. External signal of 0-20 mA
7. Network signal

J. Provide interface module to connect the factory installed DDC unit controller to the Building Management and Control System provided in other sections of these specification. Interface

module shall be installed in the controls compartment adjacent to the DDC Controller. Assist the BMCS contractor in connecting to the control network and mapping all points.

1. Interface module shall connect to the BMCS using BACnet.

2.7 REFRIGERANT DETECTION SYSTEM

A. Provide factory installed and tested Refrigerant Detection System to maintain refrigerant concentration below the Detection Threshold Limit Value (DTLV) in accordance with U.L. 60335-2-40.

2.8 AIRFLOW MEASURING STATION

A. Provide factory installed and calibrated airflow measuring transducer with BACnet communication, NEMA 4X enclosure and multi-line LCD display. Station shall have 32-158 degree F temperature and 0-95% non-condensing humidity operating range. Accuracy shall be +- 2% of reading. Provide temperature input to automatically correct actual airflow.

2.9 DUCT SMOKE DETECTION (UNITS MORE THAN 2000 CFM)

A. Interlock Direct Digital Control system with duct smoke detectors provided in Division 16 specification section “Fire Alarm” in accordance with NFPA 70 and NFPA 90A.

B. Provide UL listed duct smoke detectors in the supply duct per NFPA 90A Chapter 6.

1. Interlock Direct Digital Control system to shut down the unit upon detections of smoke in the ductwork

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine areas for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Unit Support on grade: Install units level on reinforced concrete pad. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to concrete pad with anchor bolts.

B. Unit Support on roofs: Install units level on roof curbs or supports as indicated in accordance with manufacturer’s instructions. Refer to structural drawings for support framing required for curbs.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at horizontal unit connections.
2. Connect supply ducts to RTUs with flexible duct connectors specified in Section "Air Duct Accessories."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. RTU will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to compressor, coils, and fans.
3. Inspect internal insulation.
4. Verify that labels are clearly visible.
5. Verify that clearances have been provided for servicing.
6. Verify that controls are connected and operable.

7. Verify that filters are installed.
8. Clean condenser coil and inspect for construction debris.
9. Verify lubrication on fan and motor bearings.
10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
11. Adjust fan belts to proper alignment and tension.
12. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

13. Inspect and record performance of interlocks and protective devices; verify sequences.
14. Operate unit for an initial period as recommended or required by manufacturer.
15. Calibrate thermostats.
16. Adjust and inspect high-temperature limits.
17. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
18. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
20. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Outdoor-air intake volume.

21. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

22. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. Low-temperature safety operation.
    b. Filter high-pressure differential alarm.
    c. Smoke and firestat alarms.

23. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

3.8 EXTRA MATERIALS

A. Provide the following extra materials for each unit at substantial completion or as noted below. The contractor shall obtain a receipt for all items turned over to the owner.

1. Belts – Provide 1 complete set of belts for each unit with a belt drive motor.
2. Filters – Provide 4 complete set of filters for each unit

    a. Provide initial set of filters and install prior to equipment startup.
    b. Install second set of filters prior to Test Adjust and Balance work.
    c. Provide two complete sets of filters to the owner (obtain written receipt signed by owner’s personnel.)
    .

END OF SECTION 15735

SECTION 15739 - SPLIT-SYSTEM HEAT PUMP UNITS

PART 1 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

A. This Section includes split-system air-to-air heat pump units consisting of separate indoor units with evaporator and fan and outdoor units with compressor and condenser components. Indoor units are designed for vertical or horizontal mounting, and are connected to ducts. Outdoor units are air cooled and designed for roof or pad mounting as indicated.

1.3 Submittals

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For split-system heat pump units to include in emergency, operation, and maintenance manuals.

1. Air cooled outdoor units.
2. Indoor air unit and direct expansion cooling coils.
3. Air filter.
4. Refrigeration components.

E. Warranty: Special warranty specified in this Section.

1.4 Quality Assurance

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 Warranty

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five years from date of Substantial Completion.

1.6 Extra Materials

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Filters: Furnish four (4) complete sets of filters for each unit.
   1. Install initial set prior to equipment startup.
   2. Install second set prior to Test, Adjust and Balance work.
   3. Furnish two (2) complete sets of filters for each unit and obtain receipt (signed by owner's personnel.)

PART 2 - PRODUCTS

2.1 Manufacturers

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal;
   1. Heat pumps for 208/230 volt, single phase power;

	Outdoor Unit	Indoor Unit
Trane	4TWR7	TEM
Lennox	EL18XPV	CBA38MV
Carrier	25HNB6	FE4A
Daikin	DZ16TC	DV61PT

   2. Heat pumps for 208 volt, three phase power;

	Outdoor Unit	Indoor Unit
Trane	4TWA7	TEM
Lennox	SPB	CBA38MV

2.2 Indoor, Evaporator-Fan Components (5 tons or less)

A. Cabinet: Galvanized or enameled steel with removable panels on front and ends in manufacturer's standard color. Provide manufacturer's verification that cabinet leakage does not exceed 2% when tested in accordance with ANSI/ASHRAE Standard 193-2010 "Method of Test for Determining the Air Tightness of HVAC Equipment".

B. Insulation: Faced, glass-fiber, rigid insulation.

C. Drain Pans: Corrosion resistant insulated plastic with connection for drain.

D. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

E. Electric Coil: Factory-installed; helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; one-time fuses in terminal box for overcurrent protection; and required heating controls with control circuit transformer.

F. Fan: Direct drive, centrifugal, as indicated. Fan shall be forward-curve, statically and dynamically balanced.

G. Fan Motors:

1. Special Motor Features: Multitapped, multispeed for direct drive.
   a. Electronically Commutated motor (ECM).
   b. Internal thermal protection.
   c. Permanently mounted.
   d. Resiliently mounted.

H. Disposable Filters: 2" thick, pleated, MERV 8.

I. Filter Housing: Designed for 2" thick filter and equipped with access panel/door for easy filter removal/replacement.

J. Single Point Electrical Connections: Units shall have a single point of connection for all electrical power and shall be internally wired at the factory including fan, electric heat, and all required transformers, contactors, etc.

2.3 Air-Cooled, Outdoor Compressor-Condenser Components (5 tons or less)

A. Casing: Galvanized steel, finished with baked enamel in manufacturer's standard color, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Louvered heavy gauge steel panels, or hail guards, on all four sides to prevent damage to the coil.

C. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Scroll.
2. Two stage compressor.
3. Time/temperature defrost control.
4. High and low pressure switch monitoring with automatic reset.

D. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

E. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.

F. Factory installed, 100% molecular-sieve, bead type, bi-flow, liquid line drier.

G. Fan: Aluminum-propeller type, directly connected to motor.

H. Motor: Permanently lubricated, totally enclosed, with integral thermal-overload protection.

I. Low Ambient Kit: Permits cooling operation down to 30 deg F.

J. Crankcase heater.

K. Accessories

1. Thermostat: BaCnet compatible
2. Compressor time delay.
3. Automatic-reset timer to prevent rapid cycling of compressor.
4. Freezestat to de-energize compressor if the evaporator entering air temperature is below 34 degrees F.
5. Fire Protection Thermostats: Provide manual reset type adjustable fire protection thermostats set @ 165ºF to automatically shut down the indoor unit fan for the following systems:
   a. Units with a scheduled fan capacity of 2,000 cfm or less that have a recirculating (return air) system and serve all areas used for egress. Locate thermostats in the return air upstream of any connection of exhaust or outside air.
6. Duct Smoke Detectors: Interlock units with smoke detectors by Division 16 contractor.

PART 3 - EXECUTION

A. Installation

1. Install units level and plumb.
2. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
3. Install and connect refrigerant piping to component's fittings. Install piping to allow access to unit and route as indicated on the drawings.

B. Connections

1. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to unit to allow service and maintenance.

3. Duct Connections: Duct installation requirements are specified in 15815 “Metal Ducts”. Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system heat pump units with flexible duct connectors. Flexible duct connectors are specified in 15820 “Ductwork Accessories".
4. Ground equipment according to Division 16 “Grounding and Bonding".
5. Electrical Connections: Comply with requirements in Division 16 Sections for power wiring, switches, and motor controls.
6. Install and connect control wiring. Provide conduit, conductors, and cable in accordance with the requirements of Division 16.
7. Unless specifically indicated otherwise, provide a welded steel angle frame with insulated sheet metal sides and bottom as detailed on the drawings. Connect outside air duct and return air duct to the plenum each with an opposed blade volume damper. Install dampers in an accessible location to allow easy adjustment for test and balance work.

C. Field Quality Control

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
2. Perform the following field tests and inspections and prepare test reports:
3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
4. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
6. Remove and replace malfunctioning units and retest as specified above.

D. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
2. Complete installation and startup checks according to manufacturer's written instructions.

E. Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 7 to plus 10 inch wg (minus 1750 to plus 2500 Pa). Metal ducts include the following:

1. Rectangular ducts and fittings.
2. Single-wall and double wall, round spiral-seam ducts and formed fittings.
3. Double-wall, rectangular ducts and fittings.
4. Duct liner.

B. Related Sections include Division 15 Section 15820, "Ductwork Accessories," for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air moving and distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

B. Ducts shall be single-wall except where indicated to be double-wall on the Drawings.

1.4 SUBMITTALS

A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot (1:50) scale. Show fabrication and installation details for metal ducts.

1. Duct layout indicating sizes and pressure classes.
2. Elevations of top and bottom of ducts.
3. Fittings.
4. Reinforcement and spacing.
5. Seam and joint construction.
6. Penetrations through fire-rated and other partitions.
7. Equipment installation based on equipment being used on Project.
8. Duct accessories, including access doors and panels.
9. Hangers and supports, including methods for duct and building attachment.

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Codes and Standards:

1. SMACNA Standards: "HVAC Duct Construction Standards, Metal and Flexible."
2. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
3. International Mechanical Code.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 (Z180) coating designation and G90 for ducts located on building exterior. Ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.

D. Stainless Steel: ASTM A 480/A 480M, Type 304, and having a No. 2D finish for concealed ducts and No. 4 finish for exposed ducts.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 DUCT LINER FOR DOUBLE WALL DUCTWORK

A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.

1. Materials: ASTM C 1071.

a. Thickness: 1 inch (25 mm).
b. Thermal Conductivity (k-Value): 0.26 at 75 degrees F (0.037 at 24 degrees C) mean temperature.

c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.

2. Tensile Strength: Indefinitely sustain a 50 lb (23 kg) tensile, dead-load test perpendicular to duct wall.
3. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
4. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.3 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber-reinforced fabric.

C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

2.5 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Duct Size: Maximum 30 inches (750 mm) wide and up to 2 inch wg (500 Pa) pressure class.
2. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. feet (0.93 sq. meter) of nonbraced panel area unless ducts are lined.

2.6 APPLICATION OF LINER IN DOUBLE WALL RECTANGULAR DUCTS

A. Adhere single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.

C. Butt transverse joints without gaps and coat joint with adhesive.

D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.

F. Apply adhesive coating on longitudinal seams.

G. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.

H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

1. Fan discharges.
2. Intervals of lined duct preceding unlined duct.
3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.

I. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

1. Sheet Metal Inner Duct Perforations: 3/32 inch (2.4 mm) diameter, with an overall open area of 23 percent.

J. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 ROUND DUCT AND FITTING FABRICATION

A. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

1. Manufacturers:

a. Dixie Sheet Metal Works – Falls Church, VA
b. Duct Direct – Houston, TX
c. Eastern Sheet Metal
d. Graco Metals
e. Hamlin Sheet Metal
f. Mason Road Sheet Metal
g. McGill Airflow Corporation
h. SEMCO Incorporated
i. Spiral Pipe of Texas
j. Spiral Systems, Inc.

B. Duct Joints:

1. Ducts up to 20 Inches (500 mm) in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.

2. Ducts 21 to 72 Inches (535 to 1830 mm) in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.

3. Round Ducts and exterior rectangular: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.

    a. Manufacturers:

        1) Ductmate Industries, Inc.
        2) Lindab Inc.

C. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.

D. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.

E. Fabricate elbows using die-formed or mitered construction. Bend radius of die-formed shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Continuously welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

2. Round Mitered Elbows: Continuously welded construction with the following metal thickness for pressure classes from minus 2 to plus 2 inch wg (minus 500 to plus 500 Pa):

    a. Ducts 3 to 36 Inches (75 to 915 mm) in Diameter: 0.034 inch (0.85 mm).

3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2 to 10 inch wg (500 to 2500 Pa):

    a. Ducts 3 to 26 Inches (75 to 660 mm) in Diameter: 0.034 inch (0.85 mm).
    b. Ducts 27 to 50 Inches (685 to 1270 mm) in Diameter: 0.040 inch (1.0 mm).

4. Round Elbows 8 Inches (200 mm) and Less in Diameter: Fabricate die-formed elbows for 45 and 90 degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
5. Round Elbows Larger than 9 Inches in Diameter: Fabricate mitered elbows for 30, 45, 60, and 90 degrees.
6. Die-Formed Elbows for Sizes through 8 Inches (200 mm) in Diameter and All Pressures 0.040 inch (1.0 mm) thick with 2-piece welded construction.

2.8 DOUBLE-WALL DUCT AND FITTING FABRICATION

A. Ducts: Fabricate rectangular and round double-wall (insulated) ducts with an outer shell and an inner duct. Dimensions indicated are for inner ducts.

1. Outer Shell: Base metal thickness on outer-shell dimensions. Fabricate outer-shell lengths 2 inches (50 mm) longer than inner duct and insulation and in metal thickness specified for single-wall duct.

2. Insulation: Fibrous glass, unless otherwise indicated. Terminate insulation where double-wall duct connects to single-wall duct or uninsulated components, and reduce outer shell diameter to inner duct diameter.

    a. Provide insulation to meet the following minimum R-Values.
        1) Exterior Supply and Return ducts: 6.0
        2) Interior Supply and Return ducts concealed: 6.0
        3) Interior Supply ducts exposed: 6.0
        4) Interior Return ducts exposed: 3.5

3. Perforated Inner Ducts: Fabricate with 0.028 inch (0.7 mm) thick sheet metal having 3/32 inch (2.4 mm) diameter perforations, with overall open area of 23 percent. Provide mylar liner and construct to separate fiber glass from airstream and prevent erosion of fiber glass into air stream.
4. Maintain separation of inner duct to outer shell by mechanical means. Prevent dislocation of insulation by mechanical means.

B. Fittings: Fabricate double-wall (insulated) fittings with an outer shell and an inner duct.

1. Perforated Inner Ducts: Fabricate with sheet metal having 3/32 inch (2.4 mm) diameter perforations, with overall open area of 23 percent. Gauge of inner duct shall be same as outer duct. Provide mylar liner and construct to separate fiber glass from airstream and prevent erosion of fiber glass into air stream.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: Low pressure, 2 inch wg (500 Pa).
2. Supply Ducts: Medium/high pressure 5 inch wg (1250 Pa).
3. Return Ducts (Negative Pressure): 1 inch wg (250 Pa).
4. Exhaust Ducts (Negative Pressure): 2 inch wg (500 Pa).

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install round and flat-oval ducts in lengths not less than 12 feet (3.7 meters) unless interrupted by fittings.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, size, and shape and for connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.

F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Exposed supply air/return air duct shall be sealed from dust and debris during storage and after installation.

I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

L. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

M. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

N. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).

O. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section 15820, "Ductwork Accessories."

P. Roofs and Canopies: Where ducts are located on roofs or canopies, provide G90 sheet metal shields over top and vertical sides of all duct joints. Solder all seams in joint shields and seal to exterior duct layer for watertight ductwork. Provide roof supports as indicated.

Q. Protect duct interiors from the elements and foreign materials until installed. Follow SMACNA's "Duct Cleanliness for New Construction."

R. Install double wall ducts where indicated and where located on building exterior.

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

1. For pressure classes lower than 2 inch wg (500 Pa), seal transverse joints.

B. Seal and test ducts before external insulation is applied.

C. Test ducts in accordance with SMACNA. Make necessary repairs to sustain test pressure with not more than 5 percent leakage.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet (5 meters) and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 15 Section 15820, "Ductwork Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 15815

SECTION 15820 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of ductwork accessories work is indicated on Drawings and in Schedules and by requirements of this Section.

B. Types of ductwork accessories required for project include the following:

1. Low pressure manual dampers.
2. Turning vanes.
3. Duct hardware.
4. Duct access doors.
5. Flexible connections.

C. Refer to other Division 15 sections for testing, adjusting, and balancing of ductwork accessories; not work of this Section.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
2. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers."
3. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction and installation instructions.

B. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data and product data in maintenance manual; in accordance

with requirements of Division 1 Sections and Division 15 Section, "Basic Mechanical Materials and Methods."

PART 2 - PRODUCTS

2.1 DAMPERS

A. Low Pressure Manual Dampers: Provide manual volume dampers constructed of galvanized steel.

1. Square and Rectangular Dampers: Dampers shall have minimum 20 gauge frames and minimum 20 gauge roll formed blades. Multi-blade dampers shall have interlocking corrugated edges. Damper linkage shall be concealed in the damper frame. Dampers for ducts smaller than 36 inches by 12 inches may be single blade dampers, all other dampers shall have multiple blades. Provide opposed blade type unless indicated otherwise.
2. Round Dampers: Dampers shall be minimum 20 gauge frame and 20 gauge blade. Blade shall be secured to 3/8 inch square or 1/2 inch diameter galvanized or plated axle/shaft that extends beyond frame through bearings and locking hand quadrant.
3. Dampers shall include permanently lubricated oilite bronze bearings pressed securely into damper frame.
4. Dampers shall include factory furnished locking quadrants with 2 inch elevated dial and "OPEN" and "CLOSED" indicators.

B. Manufacturer: Subject to compliance with requirements, provide balancing dampers of one of the following or approved equivalent:

		Single Blade	Opposed Blade	Parallel Blade	Round Blade
1.	Ruskin	MD35	MD35	MD35	MDRS25
2.	Greeneck	MDB-15	MDB-15	MDB-15	MBDR-50
3.	Pottoroff	CD10	MD42	MD41	CD10R

2.2 TURNING VANES

A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards."

2.3 DUCT HARDWARE

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:

1. Test Holes: Provide in ductwork at fan inlet and outlet and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.

2.4 DUCT ACCESS DOORS

A. General: Provide where indicated, duct access doors of size indicated.

B. Construction: Construct of same or greater gage as ductwork served; provide insulated doors for insulated ductwork with minimum 1 inch insulation k-valve = 0.26 at 75 degrees F mean temperature sandwiched between sheetmetal panels. Provide flush frames for uninsulated ductwork; extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12 inches high and smaller, 2 handle-type latches for larger doors. Screwdriver operated latches are not acceptable.

2.5 FLEXIBLE CONNECTIONS

A. Provide flexible duct connections wherever ductwork connects to HVAC equipment, fans or other vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Where ducts take off mains, and where ducts divide, install splitter dampers or volume dampers, each with adjustable locking quadrant control. Provide volume damper unless splitter damper is indicated. Provide adjustable pivoting splitter with locking quadrant control for all splitter dampers. Provide a volume damper after each splitter damper, located in the branch with the lowest resistance.

C. Concealed dampers that are not accessible shall be controlled by a concealed regulator type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.

D. Install turning vanes in all square or rectangular 90 degree elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

E. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.

F. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers, and adjust for proper action.

B. Final positioning of manual dampers is specified in Division 15 Section, "Testing, Adjusting, and Balancing."

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 15838 - POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Centrifugal roof exhaust ventilators

1.3 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated.

B. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 01.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Centrifugal Roof Ventilators:
   a. Acme; Model PRN
   b. Loren Cook Company; Model ACED
   c. Greenheck Fan Corp.; Model G
   d. Twin City Fan Company; Model BCRD
   e. Penn Barry DX Series

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Description: Direct or belt-driven centrifugal fans as indicated consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

1. Downblast Units: Provide spun-aluminum discharge baffle to direct discharge air downward.
2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Disconnect Switch: Nonfusible type mounted inside fan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2 inch (13 mm) mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
4. Variable speed controller for electronically commutated motor.

F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2 inch (40 mm) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2 inch (40 mm) wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Built-in raised cant and mounting flange.

2. Overall Height: As required for air stream leaving fan housing outlet to be minimum 40 inches above the roof surface.
3. Pitch Mounting: Manufacture curb for roof slope.
4. Roofing Pattern: Manufacture curb to fit rib pattern of metal roof.

2.3 MOTORS

A. Manufacturer's standard electronically commutated motor.

2.4 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware.

C. Install units with clearances for service and maintenance.

D. Suspend ceiling mounted ventilators from structure with hanger rods and vibration isolators.

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 16 Sections. Drawings indicate general arrangement of ducts and duct accessories.

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment. Refer to Division 16 Section 16060, "Grounding and Bonding".

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.3 FIELD QUALITY CONTROL

A. Equipment Startup Checks:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors and starters.
3. Verify that cleaning and adjusting are complete.
4. Verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation.
5. Verify lubrication for bearings and other moving parts.

B. Starting Procedures:

1. Energize motor.
2. Measure and record motor voltage and amperage.

C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

D. Refer to Division 15 Section 15950, "Testing, Adjusting, and Balancing," for testing, adjusting, and balancing procedures.

E. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 CLEANING

A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.

B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

END OF SECTION

SECTION 15861 - AIR IONIZATION SYSTEMS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Performance and design criteria for air ionization systems.
2. Needlepoint Bipolar Ionization (NPBI™) System Components:

a. Non-Auto Cleaning - AC Voltage Output:

1) Modular air ionization system.

b. Non-Auto-Cleaning - DC Voltage Output:

1) Flexible ion strip air ionization device, 18 inches (457 mm) long.
2) Flexible ion strip air ionization device, 36 inches (914 mm) long.
3) Needlepoint bipolar air ionization device with BAS alarm contacts.

c. Auto-Cleaning - DC Voltage Output.

1) Auto-cleaning needlepoint bipolar ionization system. Up to 2,400 CFM of 6 tons per device.
2) Auto-cleaning needlepoint bipolar ionization system. Up to 4,800 CFM or 12 tons per device.
3) Auto-cleaning needlepoint bipolar ionization devices.

1.3 RELATED WORK

A. The following items are not included in this Section and are specified under the designated Sections:

1. Section Testing, Adjusting and Balancing for HVAC.
2. Section Building Management and Control System
3. Section Refrigerant Piping.
4. Section Metal Ducts
5. Section Ductwork Accessories.
6. Section HVAC Air Cleaning Devices; Filters.
7. Section Common Work Results for Electrical; Electrical Wiring.

8. Section Control-Voltage Electrical Power Cables; Control Wiring.

1.4 REFERENCED CODES and STANDARDS

A. The following codes and standards are referenced throughout. The edition used is that currently enforced by authorities having jurisdiction (AHJ) at the Project's location. In absence of such direction then as referenced by the current enforceable IBC code or as indicated in the Contract Documents, except where specifically referenced.

1. ASHRAE Standards 62.1.
2. National Electric Code NFPA 70.
3. UL 867 for electrical safety.
4. UL 2998 Certification - Zero Ozone Emissions - as required by ASHRAE 62.1-2019.

1.5 DEFINITIONS

A. NPBI - Needlepoint bipolar ionization system

1.6 ACTION SUBMITTALS

A. Product Data: For each product. Include dimensions; operating characteristics; required clearances and access; rated capacity; fire classification; furnished specialties; and accessories as indicated.

B. Product Data: Manufacturer's technical product data for ionization systems.

1. Schedule of ionization systems indicating unit designation, number of each type required for each unit/application.
2. Data sheet for each ionization system type, and accessories furnished. Indicate construction, sizes, and mounting details.
3. Ion performance data for each type of ionization device furnished.
4. Product drawings detailing physical, electrical and control requirements.
5. Proof of Compliance with UL-2998: Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners

    a. Certificates must be listed on either of the following websites.

        1) https://spot.ul.com/.
        2) https://sustainabilitydirectory.intertek.com/home.

C. Shop Drawings: For each Needlepoint Bipolar Ionization (NPBI^{TM}) device.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Show assembly, dimensions, materials, and methods of assembly of components.
3. Include setting drawings, templates, and requirements for installing.
4. Include diagrams for power, signal, and control wiring.

D. Operating and Maintenance Data:

1. Submit O&M data and recommended spare parts lists. Include 10 years of operations and energy costs.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Ion performance for each type of Needlepoint Bipolar Ionization (NPBI™) system as detailed in this specification.

B. Field Quality-Control Reports.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of Needlepoint Bipolar Ionization (NPBI™) system.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company who specializes in manufacturing products specified in this section. Documented Experience: 10 years.

1. A qualified representative of the manufacturer shall be available to inspect the installation of the air ionization system to ensure installation in accordance with manufacturer's recommendation.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: In factory fabricated shipping containers.

1. Identify on outside of container type of product and location to be installed.
2. Avoid crushing or bending.

B. Storage: In original cartons and protect from weather and construction work traffic.

1. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.11 WARRANTY

A. Equipment is warranted by the manufacturer against defects in material and workmanship for a period of THREE years after shipment.

1. Labor to replace equipment under warranty: Provided by Owner or installing contractor.
2. Warranty will be for full replacement within three-year period and not prorated.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Provide Products manufactured by the following:

1. Global Plasma Solutions.
2. Bioclimatic Air Systems

B. Substitutions: In accordance with provisions in Section 01600.

1. It is the responsibility of manufactures to confirm non-infringement on intellectual property.

2.2 PERFORMANCE AND DESIGN CRITERIA FOR AIR IONIZATION SYSTEMS

A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Needlepoint Bipolar Ionization (NPBI™) system with output as described here within.

B. Project Design:

1. If using ASHRAE Standard 62.1 - IAQP: IAQ Procedure requires a qualified Designer or Engineer to provide Indoor Air Quality calculations using formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted.
2. Unacceptable Technologies:

a. Powered particulate filters.
b. Polarized media filter.
c. Uni-polar ion generators.
d. “Plasma” particulate filters.
e. High-powered ionization devices.
f. Ozone generators.
g. Photocatalytic Oxidation (PCO) products.
h. Dry hydrogen peroxide products.

C. Maximum Ozone Emissions per UL 2998:

1. Not Acceptable: Products not certified to UL2998 - Environmental Claim Validation Procedure for Zero Ozone Emissions.

D. All devices shall be listed on the UL SPOT environmental claim validation website, or the Intertek Sustainability Certification Directory website, proving compliance to UL 2998.

1. Test result reports must be available from Manufacturer upon request.
2. Not Acceptable: Products not listed on either of these websites are not acceptable.

E. Humidity: Ionization devices do not require preheat protection when relative humidity of entering air exceeds 85 percent. Relative humidity from 0 to 100 percent, condensing, will not cause damage, deterioration, or dangerous conditions within the air ionization system.

F. Ionization Requirements: Installed as indicated on the Drawings or as specified.

1. Ionization Output: Positive and negative ions shall be produced. Unipolar ionization devices are not acceptable. Output varies from product to product. See specific product specification information for total ion output.

a. Ion Output: Ions per cubic centimeter when tested at 1 inch (25 mm) from the ionization system.

1) Manufacturers showing ion output in ions/cc/sec must convert to ions/cc as measured 1 inch (25 mm) from the electrodes without airflow and provide that data during the submittal process. Ion meters measure in ions/cc not ions/cc/sec and these values are required for field verification during commissioning.

G. NPBI™ Components:

1. Tested by UL or Intertek proving conformance to UL 2998 Third Edition (2020) ozone standard when tested using UL 867 Fifth Edition (2011) methodology. Testing must be large chamber environment testing and peak ozone test for electronic devices in accordance with the standard.

a. Submit independent UL 867 test data with ozone results to Engineer of Record during submittal process.
b. Components achieving UL 867 prior to December 21, 2007, were not tested with the ozone amendment and are not acceptable for consideration.
c. Increasing interior ion concentration levels, both positive and negative collectively, to a minimum of 2000 ions/cc measured 5 ft (1524 mm) from floor where air is delivered from the duct system.
d. Produce positive and negative ions.

1) Not Acceptable: Uni-polar ion devices.

e. Air exchange rates may vary through the full operating range of a constant volume or variable air volume (VAV) system. The quantity of air exchange must not be increased due to requirements of the air ionization system.
f. Velocity Profile: Maintain minimum air velocity of 300 feet per minute (FPM). Air ionization devices do not have maximum velocity profiles.

H. Ion Systems: General.

1. Ionization Devices Enclosures: Non-metallic materials for corrosion prevention and thermal bridging.
2. UL 2998 Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners certification is required. No exceptions.
3. Integral Alarm Dry Contacts: For connection to BAS to prove ionization system is receiving adequate input power.
4. Capable of operating in 100 percent relative humidity conditions, without damage.
5. No maximum velocity limitation.
6. Mounting: Magnets or self-tapping sheet metal screws.

I. Design Requirements for Non-Coil Cleaning Installations:

1. Installations must include the required number of electrodes and power generators sized to the air handling equipment capacity.
2. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Carbon fiber clusters must contain a minimum of 45,000 needles.

    a. Not Acceptable: titanium, stainless or any other metal.
    b. Not Acceptable: Bipolar ionization tubes manufactured of glass, composite, mica, or similar dielectric materials.
    c. Energize when main unit disconnect is turned on and fan is operating.

        1) Not Acceptable: Ionization systems requiring mechanical air pressure switches to cycle electrodes when fan is operating.

    d. Electrode Pair: Provide electrodes to generate both positive and negative ions.
    e. Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.

        1) Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning

3. Multi-Voltage Input: [24V to 240V AC or DC] [24V or 110 to 240V AC or DC].
4. Magnets for mounting to fan inlet.
5. Auto-Cleaning Mechanisms: Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.

    a. Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning.

J. Design Requirements for Coil Cleaning Installations: GPS-iMOD®

1. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Not Acceptable: titanium, stainless or any other metal.

    a. Provided in 6 inch (152 mm) sections for field assembly by installer. Assemble such that entire finned width of the coil is covered.
    b. One modular ionization bar for every 5 ft (1524 mm) of coil height.
    c. Electrode Spacing: 0.5 inch (13 mm) apart.

        1) Not Acceptable: Ionization Bars with ion output spaced greater than 1 inch (25 mm) apart.

    d. Output: A minimum of 140M ions/cc per inch of bar measured 1 inch (25 mm) from carbon fiber brushes.
    e. Ionization Bars: Provided with separate power supply capable of powering up to 4 ionization bars requiring no more than 20 watts of power up to a total connected bar length of 48 ft (14.63 m). Single bar length limit is 12 feet.

        1) The ionization bars and power supply to be alternating current output.
        2) Provided with an on/off switch with LED light.
        3) BAS interface capable using dry alarm contacts.

    f. AC Output Power Supply: Accept 24 VAC, 110 VAC or 208 to 240VAC input.

2. NEMA 4 Enclosure: For external power mounts.

K. Electrical Requirements: Wiring, conduit, and junction boxes.

1. Installed within housing plenums in accordance with NEC NFPA 70.
2. NPBI™ Units: Accept electrical service of 24 VAC to 240 VAC, universal 2 wire input, 1 phase, 50/60 Hz.
3. Coordinate electrical requirements with air ionization device manufacturer during submittals.

L. Control Requirements:

1. NPBI™ Devices:

a. Internal short circuit protection.
b. Overload protection.
c. Automatic fault reset circuit breakers.
d. Capable of interfacing with the BAS system.

1) Provide dry contacts to prove the unit is receiving adequate input power.

e. Not Acceptable: Manual fuses.

2. Ionization output: Varies as airflow velocity changes.

a. Not Acceptable: Mechanical airflow switch to activate NPBI™ devices, due to high failure rates and possible pressure reversal.

3. Mount and wire NPBI™ devices within air handling units specified or as shown or the Drawings. Follow manufacturer IOM instructions during installation.

2.3 NON-AUTO-CLEANING - AC VOLTAGE OUTPUT

A. Product: GPS-iMOD®. Modular Bipolar Ionization Device. Made of composite and carbon fiber. Handles 50 to 250 CFM per inch of bar. Voltage selector switch, illuminated On/Off switch, operation status LED, six HV output ports, integral Building Automation System (BAS) alarm contacts, auxiliary terminals for connection of an optional GPS-iDETECT-P™ Ion Sensor. GPS-iMOD® Bar: 6 inch (152 mm) Sections, nine brushes per section, up to 144 inch (3658 mm) total length, with rare earth magnets for easy spacing and mounting.

1. Electrical Listings: UL, cUL.
2. Standards Compliance: UL 2998, UL 867, IAQP, OSHPD Seismic (OSP), CE, CARB.
3. Input Voltage: 24/120/208-240 VAC.
4. Amps: 0.500 A/0.120 A/0.065 A.
5. Frequency: 50/60 Hz.
6. Output Voltage: 5 kV RMS.
7. Output Frequency: 50/60 Hz.
8. Total Ion Output: Greater than 140M ions/cc per inch of bar.
9. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.

11. Power Entry: UL Listed, line cord with 3-prong plug.
12. Power Unit Dimensions (LxWxH): 9.00 x 3.25 x 4.75 inches (229 x 83 x 121 mm).
13. Ionizer Bar Dimensions (HxW): 1.6 x 0.75 inches (41 x 19 mm).

    a. Length per Section: 6.0 inches (152 mm). Plus 1.2 inches (30.5 mm).
    b. Maximum Length: 144 inches (3658 mm)

14. Power Unit Weight: 4.63 lbs (2.1 kg).
15. Ionizer Bar Weight: 0.24 lbs (113 grams) per 6.0 inch (152 mm) section.
16. Install locations: Duct work, in the air flow, between evaporator coil and filter.
17. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.

2.4 NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-iRIB®-18, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 18 inches (457 mm), for use up to 36 inch applications, operation status LED, integral Building Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 110 to 240 VAC.
4. Power Consumption: 5 Watts.
5. Frequency: 50/60 Hz.
6. Output Voltage: 2 kV.
7. Total Ion Output: Greater than 35 M ions/cc per ft.
8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
9. Alarm Contact Rating: 250 VAC / 1A, N.O. “dry” contact.
10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
11. Relative Humidity Range: 0 to 100 percent.
12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
13. Ionizer Strip Dimensions (WxLxH): 1.50 x 18.00 x 0.05 inches (38 x 457 x 1.3 mm).
14. Combined Weight: 0.50 lbs (227 grams).
15. Install locations: In the air flow.
16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

B. Product: GPS-iRIB®-36, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 36 inches (914 mm), for applications over 36 inches, operation status LED, integral Building

Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 110 to 240 VAC.
4. Power Consumption: 5 Watts.
5. Frequency: 50/60 Hz.
6. Output Voltage: 2 kV.
7. Total Ion Output: Greater than 35 M ions/cc per ft.
8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
9. Alarm Contact Rating: 250 VAC / 1A, N.O. “dry” contact.
10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
11. Relative Humidity Range: 0 to 100 percent.
12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
13. Ionizer Strip Dimensions (WxLxH): 1.50 x 36.00 x 0.05 inches (38 x 914 x 1.3 mm).
14. Combined Weight: 0.50 lbs (227 grams).
15. Install locations: In the air flow.
16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

C. Product: GPS-FC-3-BAS, 24 VAC or GPS-FC-3T-BAS, 110 to 240 VAC NPBI™ bipolar ionization device with BAS alarm contacts. Designed for up to 3,200 CFM or 8 tons. Carbon fiber brush emitters, operation status LED, integral Building Automation System (BAS) alarm contacts, mounting tabs, positive and negative ion output.

1. Electrical Listings: UL.
2. Standards Compliance: UL 2998, IAQP, CE, CARB.
3. Input Voltage: 24 VAC or 110 to 240 VAC.
4. Power Consumption: 1.2 Watts.
5. Frequency: 50/60 HZ.
6. Total Ion Output: Greater than 350 M ions/cc.
7. Airflow Capacity: 0 - 3,200 CFM or 8 tons.
8. Temperature Range: -20 to 140 degrees F (-28.9 to 60 degrees C).
9. Relative Humidity Range: 0-100 percent.
10. Unit Dimensions (LxHxD): 2.6 x 1.9 x 1.3 inches (66 x 48 x 33 mm).
11. Unit Weight: 0.23 lbs (104 grams).
12. Alarm Contact Rating: 24 VAC, 0.1 A, N.O. “dry” contacts.
13. Install locations: Fan Inlet, in the air flow, zoner diffuser.
14. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

2.5 AUTO-CLEANING – DC VOLTAGE OUTPUT

A. Product: GPS-FC24™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 2,400 CFM or 6 tons. Composite construction allows for mounting in corrosive environments. Universal voltage input, in line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
3. Input Voltage: 24 to 240 VAC.
4. Amps: Operating: 0.170 to 0.017 A. Cleaning Cycle: 0.33 to 0.03 A.
5. Power: Operating: 4 watts. Cleaning Cycle: 8 watts.
6. Frequency: 50/60 Hz.
7. Total Ion Output: Greater than 300M ions/cc.
8. Airflow Capacity: 0 to 2,400 CFM or up to 6 tons.
9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.
11. Ionizer Unit Dimensions (LxWxH): 7.9 x 1.1 x 5.0 inches (200 x 28 x 127 mm).
12. Ionizer Unit Weight: 1.25 lbs (567 grams).
13. Alarm Contact Rating: 250 VAC, 1A, N.O. “dry” contact.
14. Install locations: Fan inlet, In the air flow, zone diffuser.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.
    b. The high voltage output to be regulated to less than 1 percent variance.

B. Product: GPS-FC48™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 4,800 CFM or 12 tons. Composite construction allows for mounting in corrosive environments. Universal voltage input, in-line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.

1. Electrical Listings: UL, cUL.
2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
3. Input Voltage: 24 to 240V AC/DC.
4. Amps: 0.41 to 0.041 A.
5. Power Consumption: 10 Watts.
6. Frequency: 50/60 HZ.
7. Total Ion Output: Greater than 400 million ions/cc.
8. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons
9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
10. Relative Humidity Range: 0 to 100 percent.
11. Unit Dimensions (LxWXH): 11.1 x 1.84 x 3.52 inches (282 x 47 x 89 mm).
12. Weight: 1.32 lbs (600 grams).
13. Alarm Contact Rating: 250VAC, 1A, N.O. “dry” contact.
14. Install locations: Fan inlet, in the air flow, zone diffuser.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

a. Primary voltage may vary in range of 24 to 240 VAC.
b. The high voltage output to be regulated to less than 1 percent variance.

C. Product: GPS-DM48™-AC. Auto-Cleaning, Duct Mounted, needlepoint bipolar ionization system. Handles up to 4,800 CFM or 12 tons. Universal voltage input, integral display, programmable auto-cleaning cycle, operation status display, integral Building Automation System (BAS) alarm contacts, 3/4 quick turn duct adapter, 6 ft of watertight flexible conduit, and carbon fiber brush emitters.

1. Electric Approvals: UL, cUL.
2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
3. Input Voltage: 24 to 240 V AC/DC.
4. Power Consumption: 12 Watts.
5. Frequency: 50/60HZ.
6. Total Ion Output: Greater than 400M ions/cc.
7. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons.
8. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
9. Relative Humidity Range: 0 to 100 percent.
10. Unit Dimensions: 3.75 inches (95 mm) diameter. Length: 7 inches (178 mm).
11. Weight: 2.31 lbs (1.048 kg).
12. Alarm Contact Rating: 250 VAC, 1A, N.O. “dry” contact.
13. Install locations: In duct work, in the air flow.
14. Includes weathertight seals for external duct mounting.
15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.

    a. Primary voltage may vary in range of 24 to 240 VAC.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor is responsible for maintaining air systems until owner accepts the building (Owner Acceptance).

3.2 INSTALLATION, GENERAL

A. Needlepoint Bipolar Ionization (NPBI™) Systems :

1. Assemble and install equipment in a workman like manner to the satisfaction of the Engineer of Record, and Owner’s representative.
2. Damaged or faulty components must be replaced, at no cost additional cost to the owner.
3. Protect components from dust and damage daily throughout construction.

3.3 INSTALLATION, GPS-iMOD® - AC VOLTAGE OUTPUT

A. Product: GPS-iMOD®, Modular Air Ionization System.

1. Installation Location: Downstream of a MERV 6, or higher, 30 percent particulate filter to prevent unnecessary build-up of particulate on the carbon fiber needle tips.

    a. Mounting Location:

        1) Between the particulate filter and cooling coil.

2. Mechanical Installation:

    a. A quantity of 1 GPS-iMOD® bar assembly on each coil up to 60 inches (1524 mm) in height. The bars should be spaced a maximum of 60 inches (1524 mm) apart to get optimal ionization coverage on coils.

        1) Install such that the GPS-iMOD® bar covers the entire finned-width of the coil to the nearest 6 inches (152 mm) without exceeding the finned-width of the coil.
        2) Follow manufacturers published installation instructions.

3.4 INSTALLATION - NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-iRIB®-18, Flexible Needlepoint Bipolar Ionization Strip; 18 inches (457 mm) long.

1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.
2. Mechanical Installation: Follow manufacturers published installation instructions

B. Product: GPS-iRIB®-36, Flexible Needlepoint Bipolar Ionization Strip; 36 inches (914 mm) long.

1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.
2. Mechanical Installation: Follow manufacturers published installation instructions

C. Product: GPS-FC-3-BAS OR GPS-FC-3T-BAS, NPBI™ Air Ionization System.

1. Installation Location: Downstream from filter to prevent build-up of particulates on the ion emitters.

    a. Locations to mount in preferred order.

        1) Downstream from filter and blower, prior to cooling coil.
        2) Downstream from filter, blower, and coil.
        3) Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.

2. Mechanical Installation: Select a location for installation. Unit needs to be perpendicular to air flow. Mount so ion emitters are exposed to airstream. Air should flow past ion emitters like a football through goal posts.

    a. Ideal Locations:

        1) Typical Split Systems: Blower inlet on blower housing, the side opposite the blower motor. Housings should be so ion emitters extend slightly above side of blower housing.

2) Ceiling Cassette Units: On fan side of protective screen / grille.
3) Mini Split Systems: After filter and behind coil. Typically mounted to wall plate.
4) Ducted Modules: On intake side after filter between the blower housings.

b. Follow manufacturers published installation instructions.

3.5 INSTALLATION, AUTO-CLEANING - DC VOLTAGE OUTPUT

A. Product: GPS-FC48™-AC, NPBI™ Auto-Cleaning Air Ionization System.

1. Installation Locations to mount in preferred order.

a. Downstream from filter.
b. Blower inlet on blower housing, the side opposite the blower motor.
c. Downstream from filter and blower, prior to cooling coil.
d. Downstream from filter, blower, and coil.
e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.

2. Alternate Mounting Locations: Supply or return air duct after system filter.
3. Mechanical Installation:

a. Follow manufacturers published installation instructions.

B. Product: GPS-FC24™-AC, NPBI™, Auto-Cleaning Air Ionization System.

1. Installation Locations to mount in preferred order.

a. Downstream from filter.
b. Blower inlet on blower housing, the side opposite the blower motor.
c. Downstream from filter and blower, prior to cooling coil.
d. Downstream from filter, blower, and coil.
e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
f. Ductless Mini-Split Ceiling Cassette Applications: Mount unit to fan inlet. The emitter brushes should be no closer than 2 inches (51 mm) from any wiring or metal objects.

2. Mechanical Installation:

a. Follow manufacturers published installation instructions

C. Product: GPS-DM48™-AC, NPBI™ Auto-Cleaning Air Ionization System.

1. Installation Location: Supply air duct.

a. Alternate Mounting Location: Return air duct after the filter.

1) The duct must have a depth greater than 8 inches (203 mm) for unit to operate properly.

2) Weatherproof housing allows mounting indoors or outdoors.

2. Mechanical Installation:

a. Follow manufacturers published installation instructions

3.6 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

A. Comply with NECA 1.

B. Wire and Cable Installation:

1. Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.

a. Provide shielding to prevent interference and distortion from adjacent cables and equipment.

2. Terminate Wiring in a Junction Box.

a. Clamp cable over jacket in junction box.
b. Individual conductors in the stripped section of the cable must be slack between the clamping point and terminal block.

3. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
4. Install signal transmission components according to IEEE C2, REA Form 511a, NFPA 70, and as indicated.
5. Perform continuity and meager testing on wire and cable after installation.

C. Conduit Installation:

1. Comply with Section "Raceways and Boxes" for control-voltage conductors.

3.7 FIELD QUAILITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with the “Quality Assurance” Article in PART 1 of this specification and appropriate sections in Division 01.

1. Manufacturer’s Services: Coordinate manufacturer authorized representative’s services in accordance with appropriate sections in Division 01.

B. Manufacturer's Authorized Representative: Provide start-up supervision and training of Owner's personnel in the proper operation and maintenance of equipment.

3.8 TESTING

A. Provide the manufacturers recommended high voltage verification electrical test.

3.9 PROTECTION

A. Protect installed products and accessories from damage during construction.

END OF SECTION

SECTION 15890 - HVAC AIR-DISTRIBUTION SYSTEM CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cleaning HVAC air-distribution equipment, ducts, plenums, and system components.

1.2 QUALITY ASSURANCE

A. Comply with the National Air Duct Cleaners Association (NADCA) Standard for Assessment, Cleaning and Restoration of HVAC Systems (2021 Edition) for work of this section.

B. All personal performing work of this section shall be properly trained and qualified. A certified Air System Cleaning Specialist (ASCS) shall over see all work of this section.

1.3 SUBMITTALS

A. Qualifications: Provide Air System Cleaning Specialist (ASCS) certification for supervisor of all work of this section.

B. Closeout: Submit documentation verifying compliance with NADCA ACR (2021) requirements;
   1. Include certification by supervisor.
   2. Include photo images pre and post cleaning with unit references.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Use the existing service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry and for inspection.

B. Comply with NADCA ACR 2021, "Guidelines for Constructing Service Openings in HVAC Systems" Section.

3.2 CLEANING

A. Comply with NADCA ACR 2021.

B. Remove visible surface contaminants and deposits from within the HVAC system.

C. Systems and Components to Be Cleaned:

1. Air devices for supply, outside, return air and exhaust.

2. Ductwork:
   a. Supply-air ducts, including turning vanes and dampers, to the rooftop unit or air handler.
   b. Return-air ducts to the rooftop unit or air handler.
   c. Exhaust-air ducts, fans and air distribution devices.
   d. Air distribution devices including diffusers, registers, grilles, and louvers.
      1) Include supply and return plenums, air diverters, etc. on existing air distribution devices.

3. Equipment:
   a. All existing equipment not replaced in an alternate bid.

D. Collect debris removed during cleaning. Ensure that debris is not dispersed outside the HVAC system during the cleaning process.

E. Particulate Collection:

1. For particulate collection equipment, include adequate filtration to contain debris removed. Locate equipment downwind and away from all air intakes and other points of entry into the building.
2. HEPA filtration with 99.97 percent collection efficiency for particles sized 0.3 micrometer or larger shall be used where the particulate collection equipment is exhausting inside the building,

F. Control odors and mist vapors during the cleaning and restoration process.

G. Mark the position of manual volume dampers and air-directional mechanical devices inside the system prior to cleaning. Restore them to their marked position on completion of cleaning.

H. System components shall be cleaned so that all HVAC system components are visibly clean. On completion, all components must be returned to those settings recorded just prior to cleaning operations.

I. Clean all air-distribution devices, registers, grilles, and diffusers.

J. Clean visible surface contamination deposits according to NADCA ACR 2021 and the following:

1. Clean air-handling units, airstream surfaces, components, condensate collectors, and drains.
2. Ensure that a suitable operative drainage system is in place prior to beginning wash-down procedures.
3. Clean evaporator coils, reheat coils, and other airstream components.

K. Duct Systems:

1. Create service openings in the HVAC system as necessary to accommodate cleaning.
2. Mechanically clean duct systems specified to remove all visible contaminants so that the systems are capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2021).

L. Debris removed from the HVAC system shall be disposed of according to applicable Federal, state, and local requirements.

M. Mechanical Cleaning Methodology:

1. Source-Removal Cleaning Methods: The HVAC system shall be cleaned using source-removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and to safely remove these contaminants from the facility. No cleaning method, or combination of methods, shall be used that could potentially damage components of the HVAC system or negatively alter the integrity of the system.

a. Use continuously operating vacuum-collection devices to keep each section being cleaned under negative pressure.
b. Cleaning methods that require mechanical agitation devices to dislodge debris that is adhered to interior surfaces of HVAC system components shall be equipped to safely remove these devices. Cleaning methods shall not damage the integrity of HVAC system components or damage porous surface materials such as duct and plenum liners.

3.3 RESTORATION

A. Restore and repair HVAC air-distribution equipment, ducts, plenums, and components according to NADCA ACR 2021, "Restoration and Repair of Mechanical Systems" Section.

B. Comply with Section 15815 "Metal Ducts" for duct materials, accessories, and hardware required for Work of this Section.

C. Ensure that closures do not hinder or alter airflow.

D. New closure materials, including insulation, shall match opened materials and shall have removable closure panels fitted with gaskets and fasteners.

END OF SECTION 15890

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All Division 15 Specification Sections, Drawings, and general provisions of the Contract apply to work of this Section, as do other documents referred to in this Section.

1.2 SCOPE OF WORK

A. The Contractor shall obtain the services of an independent Test and Balance (TAB) Company which specializes in the testing and balancing of heating, ventilating and air conditioning (HVAC) systems to test, adjust and balance all HVAC systems in the building(s).

B. The work included in this Section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems as described in these Specifications or shown on accompanying Drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. The testing, adjusting, and balancing agency shall act as a reporting agency; that is, list and report each piece of equipment as to identification number, manufacturer, model number, serial number, proper location, specified performance, and report actual performance of all equipment as found during testing. The report is intended to be used during the life of the building as a ready reference indicating original conditions, equipment components, etc.

C. Representatives of the Test and Balance Company shall visit the job site during installation of the HVAC equipment, piping, and ductwork as required.

D. Upon completion of the HVAC system installation, the Test and Balance Company shall perform all required testing and balancing with the full cooperation of the Contractor and his Sub-Contractors. The Contractor shall make changes and/or adjustments to the HVAC system components that are required by the Test and Balance Company to accomplish proper balancing. The TAB agency shall not supply or install any materials or balancing devices such as pulleys, drives, belts, etc. All of this work is by the Contractor and shall be performed at no additional cost to the Owner.

E. The test and balance report complete with a summary page listing all deficiencies shall be submitted to the Architect for review by his Mechanical Engineer. If the Mechanical Engineer agrees with the report, he shall sign it and return it to the Architect. The test and balance report must be complete and must be accepted by the Mechanical Engineer prior to acceptance of the project. Any outstanding test and balance items shall be placed on the punch list and a monetary value shall be assigned to them.

F. After all deficiencies have been corrected, the Mechanical Engineer shall sign the testing and balancing report, and the Test and Balance Company shall supply 4 copies of the

final and complete report to the Architect for inclusion in the Operation and Maintenance Manuals.

G. The items requiring testing, adjusting, and balancing include (but are not restricted to) the following:

1. Air Systems:

a. Split System Heat Pump Units
b. Packaged Rooftop Units
c. 100% Outside Air, Packaged Rooftop Units
d. Power Ventilators
e. Supply Fan AHU
f. Duct systems
g. Diffusers, Registers, Grilles and Dampers
h. Coils (Air Temperatures)

1.3 DEFINITIONS, REFERENCES, STANDARDS

A. All work shall be in accordance with the latest edition of the Associated Air Balance Council (AABC) National Standards or the latest standards of the National Environmental Balancing Bureau (NEBB). If these contract documents set forth more stringent requirements than the AABC National Standards or the NEBB Standards, these Contract Documents shall prevail.

1.4 QUALIFICATIONS

A. Agency Qualifications: The TAB Agency shall be a current member of the AABC or the NEBB.

1.5 SUBMITTALS

A. Procedures and Agenda: The TAB agency shall submit the TAB Procedures and agenda proposed to be used.

B. Sample Forms: The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards or the NEBB Standards.

C. Job Site Inspection Report: Inspect the installation of all HVAC systems prior to TAB work. Provide inspection report to the Architect and Contractor.

1.6 TAB PREPARATION AND COORDINATION

A. Shop drawings, submittal data, up-to-date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided when available and no later than 30 days after the Designer has returned the final approved submittal data to the Contractor.

B. System installation and equipment startup shall be complete prior to the TAB agency's being notified to begin.

C. The building control system (BMCS) contractor shall provide and install the control system, including all temperature, pressure and humidity sensors. These shall be calibrated for accurate control. If applicable, the BMCS contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.

D. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.

E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

1.7 REPORTS

A. TAB Report: The TAB agency shall submit the preliminary TAB report for review by the Architect. On plans provided, all outlets, devices, HVAC equipment, etc., shall be identified (including manufacturer, model number, serial number, motor manufacturer, HP, drive type, fan and motor sheaves and belt number), along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" (or similar NEBB Guaranty) assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards (or similar NEBB Standards). The Designer shall review the TAB report and note any items which do not appear to be within the allowable tolerances. The contractor shall make corrections to the installation of these items and the TAB contractor shall retest the corrected items and resubmit the complete TAB report. The designer shall indicate his approval of the Final Tab Report and return to the contractor.

1. The Contractor shall Submit the Final TAB Report to the Architect and include in each copy of the Operation and Maintenance Manuals.

PART 2 - INSTRUMENTATION

2.1 GENERAL

A. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards (or similar NEBB Standards).

PART 3 - EXECUTION

3.1 GENERAL

A. The specified systems shall be reviewed and inspected for conformance to Design Documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards (or similar NEBB Standards). Adjustment tolerances shall be + or - 10 percent unless otherwise stated.

B. Equipment settings, including manual damper quadrant positions, valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

C. All information necessary to complete a proper TAB project and report shall be per AABC or NEBB standards unless otherwise noted. The descriptions of work required, as listed in this section, are a guide to the minimum information needed.

D. TAB contractor shall cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Upon completion, patch insulation, ductwork, and housings using materials identical to those removed. Seal insulation to reestablish integrity of the vapor barrier.

E. TAB work shall include additional inspection and adjustment of components during the season following the initial balance to include re-balance of any items influenced by seasonal changes or as directed by the Owner.

3.2 AIR SYSTEMS

A. The TAB agency shall verify that all ductwork, splitters, extractors, dampers, grilles, registers, and diffusers have been installed per design, are functional, and set full open. Any leakage in the ductwork shall be repaired prior to the test. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards or NEBB Standards:

1. For Pumps: Measure flow, suction, and discharge pressures, motor horsepower, and current draw.
2. For supply fans:

    a. Fan Speeds: Test and adjust fan RPM to achieve design CFM requirements.
    b. Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.
    c. Pitot-Tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
    d. Outside Air: Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. If a traverse is not practical use the mixed-air temperature method if the inside and outside temperature difference is at least 20 degrees

Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.

e. Static Pressure: Test and record system static pressure, including the static pressure profile of each supply fan.

3. For zone, branch and main ducts:

a. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

4. For VAV systems:

a. Identify the type, location, and size of each terminal box. This information shall be recorded on terminal box data sheets.
b. Test, adjust, and record the maximum and minimum box air quantities for each VAV box.
c. Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements.
d. Test and record entering and leaving air temperature of hot water coils with full heating air flow and water flow.
e. Insure the entering static pressure is sufficient for normal, proper box operation.

5. For diffusers, registers and grilles:

a. Tolerances: Test, adjust, and balance each diffuser, grille, and register to within 10 percent of design requirements. Minimize drafts. Include required CFM, initial test CFM and final CFM.
b. Identification: Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

6. For coils:

a. Air Temperature: Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

3.3 ADDITIONAL TAB SERVICES

A. Job Site Inspections: During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems as required.

B. Verification of HVAC Controls: The TAB agency shall be assisted by the building control systems Contractor in verifying the operation and calibration of all HVAC and temperature control systems. The following tests shall be conducted:

1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water resets, fire and freeze stats, and other safety devices.

2. Verify that all controlling instruments are calibrated and set for design operating conditions.

C. Temperature Testing: To verify system control and operation, a series of three temperature tests shall be taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

D. TAB Report Verification: At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10 percent of the total number tabulated in the report.

END OF SECTION

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Codes and Standards: Where indicated, the referenced edition shall govern. Where not indicated, the latest edition shall govern.

1.2 SUMMARY

A. This Section includes the following:
1. Supporting devices for electrical components.
2. Electrical identification.
3. Electricity-metering components.
4. Concrete equipment bases.
5. Control wiring.
6. Electrical demolition.
7. Cutting and patching for electrical construction.
8. Touchup painting.

1.3 SUBMITTALS

A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 DEFINITIONS

A. General Explanation: A substantial amount of the Contract Document Specification language constitutes specific definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated thereon. Certain terms used repetitiously in the Contract Documents are defined generally in this Article.

B. General Requirements: The provisions or requirements of the Division 1 Sections. The General Requirements apply to the entire work of the Contract, and where so indicated, to other elements of work which are included in the project.

C. Indicated: The term "Indicated" is a cross reference to details, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar means of recording requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader locate the cross reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Architect," "requested by the Architect," etc. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

E. Refer: Used to indicate that the subject is defined or specified in further detail at another location in the Contract Documents, or elsewhere as indicated. Except as otherwise noted, "refer" does not imply that the Contractor must purchase or subcontract the subject work in any special manner.

F. Approve: Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Architect's responsibilities and duties as specified in the General and Supplementary Conditions. In no case will "approval" by the Architect be interpreted as a release of the Contractor from responsibilities to fulfill the requirements of the Contract Documents.

G. Project Site: The space available to the Contractor for the performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site may or may not be identical with the description of the land upon which the project is to be built.

H. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

I. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations of the project site including unloading, unpacking, assembly, erection, placing, anchoring, connecting utilities, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

J. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for the intended use, as applicable in each instance.

K. Installer: The entity (person or firm) engaged by the Contractor or its subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2020).

1.6 HAZARDOUS MATERIALS

A. Asbestos: No asbestos-containing materials have been identified on items that are indicated to be disturbed. If asbestos-containing materials are encountered, comply with the following:

Upon encountering any previously unidentified materials which he suspects may contain asbestos, the Contractor shall immediately cease all work in the immediate vicinity of the suspected materials and notify the Designer and the Owner. The Owner shall retain consultants to identify the suspected materials. Upon identification, the Owner reserves the right to contract separately for the removal, or require the Contractor to remove said materials in accordance with the following provision. In any case, the work shall be performed by a licensed and certified Abatement Contractor.
The Louisiana Department of Environmental Quality (D.E.Q.) has issued the Louisiana Emission Standards for Hazardous Air Pollutants. Where asbestos is encountered in a project, the Contractor shall comply with all laws and ordinances pertaining to asbestos handling and abatement, including the latest revision of LAC 33:111, Chapter 25, Subchapter F, Emission Standards for Hazardous Air Pollutants, LAC 33:111, Chapter 27, Asbestos Containing Materials in Schools and Public Buildings and LAC 33:111, Chapter 51, Subchapter M, Section 5151, Emission Standards for Asbestos.

Notification should be addressed to:

Asbestos Coordinator
Louisiana Department of Environmental Quality
Air Quality Division
Post Office Box 82135
Baton Rouge, Louisiana 70884-2135

If the Owner chooses to remove any previously unidentified materials by utilizing different Contractors, the Contractor shall cooperate fully with the Owner's consultants and asbestos abatement Contractor permitting them full access to the project, and shall not resume work in the vicinity of the suspected materials until advised by the Designer and the Owner that it is safe to do so.

1.7 COORDINATION

A. The electrical Plans and Specifications are a portion of the entire project. Other portions of the project contain information and requirements that will affect the electrical work. It is the responsibility of the Electrical Contractor to review all of the Contract Documents and to include those requirements in the bid.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.

2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

E. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16 inch (14 mm) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Expansion Anchors: Carbon-steel wedge or sleeve type.

G. Toggle Bolts: All-steel springhead type.

H. Powder-Driven Threaded Studs: Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each cable size.

1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.

C. Colored Adhesive Marking Tape for Wires, and Cables: Self-adhesive vinyl tape, not less than 3/4 inch wide by 3 mils thick (18 mm wide by 0.08 mm thick).

D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend that indicates type of underground line.

E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16 inch (1.6 mm) minimum thickness for signs up to 20 sq. inch (129 sq. cm) and 1/8 inch (3.2 mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.

G. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

H. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch (1 mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4 inch (6 mm) grommets in corners for mounting.

I. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.3 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom, but no less than that required by NEC.

B. Clearances: Coordinate with other trades and/or existing conditions to maintain code required clearances above, below and around electrical equipment.

C. Materials and Components: Install level, plumb, and square to other building systems and components, unless otherwise indicated.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Selection of Supports: Comply with manufacturer's written instructions.

D. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200 lb (90 kg) design load.

3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps. Clamps less than 7 feet above the floor shall be one-piece without protruding edges or bolts.

F. Install 1/4 inch (6 mm) diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2 inch (38 mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports. Support wires shall be dedicated to the support of electrical materials and equipment. Ceiling support equipment and wires are not to be used for the support of electrical equipment. Identify electrical support wires as required by 2011 NFPA 70 300.11(A)(2).

H. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

I. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength. Field galvanize galvanized members that have been field cut.

J. Install sleeves for raceway penetrations of concrete walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and

of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

K. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
5. Steel: Welded threaded studs or spring-tension clamps on steel. No field welding of supports to structural members will be allowed.
6. Light Steel: Sheet-metal screws. Do not penetrate outer skin of building from within.
7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.

E. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Brown.
2. Phase B: Orange.
3. Phase C: Yellow.

F. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.
2. Phase B: Red.

3. Phase C: Blue.

G. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

H. Install engraved-laminated signs with black letters on white background with minimum 3/8 inch (9 mm) high lettering for equipment designations for switchgear or description of load being fed or controlled in the case of disconnects or contactors.

3.5 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials shall be fire resistant per ASTM E119 fire test conditions and shall be non-combustible when tested per ASTM E136. Melting point shall exceed 2000 degrees F. per ASTM C24. Fireproofing installation for openings in rated floors or partitions shall provide an airtight seal.

3.6 EQUIPMENT AND CONTROL WIRING

A. Wire in and connect every motor and item of equipment furnished as a part of this contract, including those furnished under other Divisions. Provide all required disconnecting means, boxes, conduit, conductors, etc. Motors and equipment furnished under other Divisions will be installed under that Division.

B. Motor starters will be furnished under the division that the motors being controlled are furnished, and will be installed under Division 16 by the Electrical Contractor unless controllers are integral to the equipment. Installation includes mounting, connection to power and grounding.

C. Control Wiring: All control wiring and interlock wiring is included in Division 15.

3.7 DEMOLITION

A. Protect existing electrical equipment and installations not indicated to be removed. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, appearance and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Existing Work to Remain: Maintain feed, or provide new feed to equipment and devices that are not being removed.

E. Remove demolished material from project site.

F. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.8 SEQUENCING AND SCHEDULING

A. Electrical power and system interruptions shall be held to a minimum and will be permitted only at times approved by the Owner. The Owner may require that any interruptions be during nights, weekends, holidays, etc. Provide any required overtime work at no additional cost to Owner.

B. Do not interrupt feed to any service, feeder or branch circuit feeding facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to make temporary provisions where required according to requirements indicated:

1. Notify Owner no fewer than seven (7) days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.
3. Provide all temporary facilities and services, including fire watch, required to maintain operation, security, and life safety.

3.9 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.10 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
1. Supporting devices for electrical components.
2. Electrical identification.
3. Electricity-metering components.
4. Concrete bases.
5. Electrical demolition.
6. Cutting and patching for electrical construction.
7. Touchup painting.

3.11 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint:

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.12 CLEANING AND PROTECTION

A. Upon completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

SECTION 16060 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

C. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.
2. Comply with NFPA 70 (2020).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connections, and Rods:

a. Apache Grounding/Erico Inc.
b. Chance/Hubbell
c. Copperweld Corp.
d. Erico Inc.; Electrical Products Group
e. Ideal Industries, Inc.
f. ILSCO
g. Kearney/Cooper Power Systems
h. O-Z/Gedney Co.; a business of the EGS Electrical Group
i. Raco, Inc.; Division of Hubbell
j. Thomas and Betts, Electrical

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section 16120, "Conductors and Cables."

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Stranded: ASTM B8.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Twist-on Connectors: Plastic body with coiled copper alloy wire forming threads.

D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

E. Underground Mechanical Connectors: Bolted-pressure type or compression type, listed for underground application.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, ¾” dia by 120” long.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted clamp type or compression connectors for conductors larger than 10 AWG. Use Plastic body twist-on connectors for 10AWG and smaller.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

3.3 INSTALLATION

A. Ground Rods:

1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
2. Electrical Service Grounding Electrode Applications: Install at least three (3) rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes; install in as straight line as conditions permit. Interconnect ground rods with grounding electrode conductors. Use exothermic welds. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Metal Gas and Compressed Air Piping: Bond any above ground metallic piping to building grounding electrode, as required by NEC 250-104(B).

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

G. Moisture Protection: If insulated grounding conductors are connected to grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified and at service disconnect enclosure grounding terminal. Measure ground resistance not less than two full days after the last trace of precipitation, and

without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

    a. Equipment Rated 500 kVA and Less: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

SECTION 16120 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Field Quality-Control Test Reports: From Contractor.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2020).

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers:

1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Senator Wire & Cable Company.
4. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5 or 7; stranded or solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

D. Conductor Insulation Types: Type THHN-THWN or XHHW complying with NEMA WC 5 or 7 as applicable.

2.2 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.
6. Ideal

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated. Push in splice and insulation displacement type connectors shall not be used.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance, Feeders and Branch Circuits: Type THHN-THWN or XHHW single conductors in raceway. Minimum size #12 AWG or larger where required for voltage drop. Where branch circuits exceed 100 feet in length, use minimum #10 AWG.

B. Fire Alarm Circuits: Type THHN-THWN, in raceway or Power-limited, fire-protective, signaling circuit cable in raceways. Size as recommended by equipment manufacturer or as specified in fire alarm specifications.

C. Class 1 Control Circuits: Type THHN-THWN, in raceway. Minimum size #14 AWG.

D. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable in raceways. Size as recommended by equipment manufacturer.

3.2 INSTALLATION

A. Run all conductors in raceways unless specifically indicated otherwise.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Identify and color-code conductors and cables according to Division 16 Section 16050, "Basic Electrical Materials and Methods."

E. No more than three current carrying phase conductors (excluding switch legs and grounding conductors), and one grounded conductor, may be installed in any raceway.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:

1. Division 16 Section 16050, "Basic Electrical Materials and Methods," for supports, anchors, and identification products.
2. Division 16 Section 16140, "Wiring Devices," for devices installed in boxes.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

F. Fixture Whip: Flexible wiring as specified from box to individual lighting fixture.

1.4 SUBMITTALS

A. Product Data: For raceways and fittings.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70 (2020).

1.6 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Manufacturers:

1. Anamet Electrical, Inc.; Anaconda Metal Hose.
2. Electri-Flex Co.
3. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
4. LTV Steel Tubular Products Company.
5. Manhattan/CDT/Cole-Flex.
6. O-Z Gedney; Unit of General Signal.
7. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1. U. L. 6. Threaded with threaded fittings.

C. IMC: ANSI C80.6. U.L. 1242.

D. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

E. Plastic-Coated IMC and Fittings: NEMA RN 1.

F. EMT and Fittings: ANSI C80.3. U.L. 797.

1. Fittings, 2 Inch Diameter and Larger: Steel (not die cast) set-screw or compression type.
2. Fittings, Smaller than 2 Inches Diameter: Compression type.

G. FMC: Zinc-coated steel.

H. LFMC: Flexible steel conduit with PVC jacket.

I. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.

7. ElecSYS, Inc.
8. Lamson & Sessions; Carlon Electrical Products.
9. Manhattan/CDT/Cole-Flex.
10. RACO; Division of Hubbell, Inc.
11. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.3 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.

1. Manufacturers:

a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
b. Thomas & Betts Corporation.
c. Walker Systems, Inc.; Wiremold Company (The).
d. Wiremold Company (The); Electrical Sales Division.

2.4 BOXES

A. Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

2.5 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:

1. Exposed: IMC.
2. Concealed: IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment: LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Use the following raceways for indoor installations:

1. Exposed in Unfinished Areas: EMT. Use IMC or Rigid Steel Conduit for locations subject to mechanical damage.
2. Exposed in finished areas: Surface metal raceway where concealment is impossible. Limit use to the least possible. The impossibility of concealment is in the opinion of the Architect.
3. Concealed: EMT.
4. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
5. Damp or Wet Locations: IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated.

C. Minimum Raceway Size: 1/2-inch trade size (DN 14) unless noted. 3/8-inch factory assembled, flexible steel "fixture whips," a maximum of 60 inches long, may be used to feed individual lay-in fluorescent lighting fixtures.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Do not support electrical equipment or raceways from ceiling grid or ceiling grid supports. Independently support all equipment and raceways directly from structural elements.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 16 Section 16050, "Basic Electrical Materials and Methods."

E. Install temporary closures to prevent foreign matter from entering raceways.

F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

H. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

I. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

J. Tighten set screws of threadless fittings with suitable tools.

K. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

M. Flexible Connections: Use maximum of 60 inches (1725 mm) of flexible conduit for recessed and semirecessed lighting fixtures. Use maximum of 12 inches (35 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

N. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Duplex receptacles.
2. Single receptacles.
3. Ground-fault circuit interrupters.
4. Single- pole switches.
5. Three way switches.
6. Double-pole switches.
7. Dimmer switches.
8. Device wall plates.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. TVSS: Transient voltage surge suppressor.

C. EMI: Electromagnetic interference.

D. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70 (2020).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):

1. Single Pole Toggle Switch, 120-277V, 20A:

    a. Hubbell #HBL1221.
    b. Leviton #1221-2.
    c. P & S #20-AC-1.

2. Two Pole Toggle Switch, 120-277V, 20A:

    a. Hubbell #HBL1222.
    b. Leviton #1222-2.
    c. P & S #20-AC-2.

3. Three-Way Toggle Switch, 120-277V, 20A:

    a. Hubbell #HBL1223.
    b. Leviton #1223-2.
    c. P & S #20-AC-3.

4. Four-Way Toggle Switch, 120-277V, 20A:

    a. Hubbell #HBL1224.
    b. Leviton #1224-2.
    c. P & S #20-AC-4.

5. Single Pole Toggle Switch with Pilot Light, 120V, 20A:

    a. Hubbell #HBL1221PL.
    b. Leviton #1221-PL.
    c. P & S #20-AC1-CPL.

6. Single Pole Double Throw, Center Off, Momentary Contact, 120/277V, 20A:

    a. Hubbell #HBL1557.
    b. Leviton #1257.
    c. P & S #1251.

7. Single Pole Double Throw Center Off, Momentary Contact, Locking, 120/277V, 20A:

    a. Hubbell #HBL1557L.
    b. Leviton #1257L.
    c. P & S #1251L.

8. Duplex Receptacle, 125V-1ϕ-20A:

    a. Hubbell #HBL5362.
    b. Leviton #5362.
    c. P & S #5362A.

9. GFCI Receptacles, 125V-1ϕ-20A:

    a. Hubbell #HBL-GF-5362.
    b. Leviton #8899.
    c. P & S #2091-S.

10. Solid State Wall Box Dimmers:

    a. Leviton "Monet" Series, incandescent or fluorescent type to match load.
    b. Lutron "Nova T-Star" Series, incandescent or fluorescent type to match load.

11. Motor Rated Switches and Manual Motor Starters:

    a. General Electric CR101 Series.
    b. Square-D FG or KG Series.
    c. P & S 78XX Series.

2.2 DEVICE PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished stainless steel. Material for Unfinished Spaces: Galvanized steel.
3. Material for Wet Locations: Thermoplastic, with spring-loaded lift cover, and listed and labeled for use in "wet locations." For receptacles, listing shall apply with plug cap inserted.

2.3 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: White, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions. Where switches are mounted adjacent to dimmers, switch shall be that dimmer manufacturer's companion device, matching dimmer style.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. Provide dimmer manufacturer's custom companion plates where dimmers and switches are mounted together.

E. Remove wall plates and protect devices and assemblies during painting.

3.2 MOUNTING HEIGHTS

A. Mount toggle switches at 48 inches above finished floor to center of toggle handle.

B. Mount receptacles, telephone outlets and data outlets 18 inches above finished floor to center of receptacle unless specifically noted otherwise.

C. Mount devices above counters at 2 inches from bottom of device to top of counter, or counter backsplash.

3.3 IDENTIFICATION

A. Comply with Division 16 Section 16050, "Basic Electrical Materials and Methods".

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 CONNECTIONS

A. Ground equipment according to Division 16 Section 16060, "Grounding and Bonding."

B. Connect wiring according to Division 16 Section 16120, "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Do not connect stranded wire to devices using back wired push-in feature.

E. When terminating stranded conductors on devices, ends of strands shall be contained by insulation so that all strands must be held by screw.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16140

SECTION 16288 – SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surge protective device at exterior HVAC equipment containing hermetic compressors.

B. Related Sections include the following:

1. Division 16 Section 16441, "Switchboards," for factory-installed TVSSs.
2. Division 16 Section 16442, "Panelboards," for factory-installed TVSSs.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. SVR: Suppressed voltage rating.

C. TVSS: Transient voltage surge suppressor.

D. SPD: Surge Protective Devices (SPD's).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.

B. Product Certificates: For SPD's, signed by product manufacturer certifying compliance with the following standards:

1. UL 1283.
2. UL 1449.

C. Operation and Maintenance Data: For SPD's to include in emergency, operation, and maintenance manuals.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain SPD's and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of SPD's and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."

E. Comply with NFPA 70 (2020).

1.6 PROJECT CONDITIONS

A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
2. Operating Temperature: 30 to 120 degrees F (0 to 50 degrees C).
3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet (6090 meters) above sea level.

1.7 COORDINATION

A. Coordinate location of SPD's to allow adequate clearances for maintenance.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within one year from date of Final Inspection.

PART 2 - PRODUCTS

2.1 SURGE PROTECTIVE DEVICES

A. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:

1. LED indicator lights for power and protection status.
2. Knockout mounted.

B. Peak Single-Impulse Surge Current Rating: 20 kA per phase.

C. Connection Means: Permanently wired.

D. Manufacturers:

1. 120/208V, three phase

a. Cutler Hammer 2-CHSA01
b. General Electric 2-9L15FCB001
c. Joslyn 1455-21
d. Square-D 2-SDSA1175

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

A. Install devices at each exterior item of mechanical equipment having a hermetic compressor. Connect on line side of local disconnect, with ground lead bonded to branch circuit ground.

B. Make arrester leads as short as possible and keep radius of bends in wire as large as is practical.

3.2 PLACING SYSTEM INTO SERVICE

A. Do not energize or connect HVAC equipment to their sources until SPD's are installed and connected.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform the following field tests and inspections and prepare test reports:

1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
2. Complete startup checks according to manufacturer's written instructions.
3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

B. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to maintain SPD’s. Refer to Division 1.

END OF SECTION 16288

SECTION 16410 - ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes individually mounted enclosed switches used for motor and equipment disconnecting means.

B. Related Sections include the following:

1. Division 16 Section 16491, "Fuses," for overcurrent protective devices installed in switches.

1.3 DEFINITIONS

A. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of switch, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Field Test Reports: Submit written test reports and include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Maintenance Data: For enclosed switches and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:

1. Routine maintenance requirements for components.
2. Manufacturer's written instructions for testing and adjusting switches.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA AB 1 and NEMA KS 1.

C. Comply with NFPA 70 (2020).

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 degrees F (minus 30 degrees C) and not exceeding 104 degrees F (40 degrees C).
2. Altitude: Not exceeding 6600 feet (2000 meters).

1.7 COORDINATION

A. Coordinate layout and installation of switches and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fusible Switches:

a. Eaton Corp.; Cutler-Hammer Products. DH Series
b. General Electric Co.; Electrical Distribution & Control Division. Type "TH"
c. Siemens Energy & Automation, Inc. "H" Series
d. Square D Co. "H" Series

2.2 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

2.3 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.4 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches for compliance with installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

B. Switches shall be mounted so that operating handle is up when switch is on and down when it is off.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section 16050, "Basic Electrical Materials and Methods."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws. Indicate load designation.

3.4 CONNECTIONS

A. Install equipment grounding connections for switches with ground continuity to main electrical ground bus.

B. Connect lightning arresters.

C. Install power wiring. Install wiring between switches and equipment.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each enclosed switch and component.
2. Test continuity of each line- and load-side circuit.

B. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 CLEANING

A. Upon completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16410

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Distribution panelboards.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports including the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1, include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Material and Equipment."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70 (2020).

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment and assembly for 100% continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 140 degrees F (40 degrees C).
2. Altitude: Not exceeding 6600 feet (2000 meters).

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.

1.7 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Enclosures: Surface-mounted cabinets as indicated. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.

    a. Outdoor Locations: NEMA 250, Type 3R.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
4. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

B. Phase and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

C. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Mechanical type.
2. Ground Lugs and Bus Configured Terminators: Mechanical type.
3. Feed-Through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
4. Neutral Lugs: Rated 100 percent of phase lugs

D. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.2 PANELBOARD SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 DISTRIBUTION PANELBOARDS

A. Manufacturers: Products: Subject to compliance with requirements, provide one of the products specified.

1. Cutler-Hammer: PRL5
2. General Electric: Spectra Series
3. Siemens: Sentron S4 or S5
4. Square-D: I-Line

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike. Omit for fused-switch panelboards.

C. Main Overcurrent Protective Devices: Circuit breaker (where scheduled).

D. Branch Overcurrent Protective Devices:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
3. Fused switches.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Full module, inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Tandem or "piggyback" breakers are not acceptable.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.

C. Mount plumb and rigid without distortion of box.

D. Install overcurrent protective devices and controllers.

E. Install filler plates in unused spaces.

F. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Create a directory to indicate installed circuit loads. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding."

B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.5 CLEANING

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

SECTION 16491 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Cartridge fuses rated 600 V and less for use in switches.

1.3 SUBMITTALS

A. Product Data: Include the following for each fuse type indicated:

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Fuse size for elevator feeders and elevator disconnect switches.

B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

C. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 1, include the following:

a. Let-through current curves for fuses with current-limiting characteristics.
b. Time-current curves, coordination charts and tables, and related data.
c. Ambient temperature adjustment information.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA FU 1.

D. Comply with NFPA 70 (2020).

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 degrees F (5 degrees C) or more than 100 degrees F (38 degrees C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Quantity equal to one complete set of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussman, Inc.
2. Ferraz Shawmut, Inc.
3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Motor Branch Circuits: Dual element, time delay, current limiting, Class RK5.

B. Other Branch Circuits: Class RK1, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 16491

SECTION 16721 - FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire alarm systems.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

A. Noncoded, analog-addressable system; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission dedicated to fire alarm service only.

1. Interface with existing Edwards EST3 fire alarm system.

1.5 QUALITY ASSURANCE

A. Codes: The equipment and installation shall comply with the current provisions of the following codes and standards:

1. National Electric Code (2014).
2. National Fire Alarm Code - NFPA 72 (2015) and all recommendations of Appendix "A."
3. NFPA 13 (2013)
4. Life Safety Code - NFPA 101 (2015).
5. Local and State Building Codes.
6. Americans With Disabilities Act Architectural Guidelines (ADAAG).
7. Applicable portions of the Louisiana State Fire Marshal's Act, Parts 1 and 2.
8. Current requirements of the Louisiana Fire Marshal's Office, Plan Review Section as outlined in http://www.dps.state.la.us/sfm/.

9. All system components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

    a. UL 268: Smoke Detectors for Fire Protective Signaling Systems.
    b. UL1481: Power Supplies for Fire Protective Signaling Systems.
    c. UL 864: Control Units for Fire Protective Signaling Systems.

B. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PERFORMANCE REQUIREMENTS

A. Fire alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Automatic sprinkler system water flow.

B. Fire alarm signal shall initiate the following actions:

1. Alarm notification appliances shall operate continuously.
2. Identify alarm at the FACP.
3. De-energize electromagnetic door holders.
4. Transmit an alarm signal to the remote alarm receiving station.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.

C. Supervisory signal initiation shall be by one or more of the following devices or actions:

1. Operation of a fire-protection system valve tamper.

D. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at the FACP.
4. Ground or a single break in FACP internal circuits.
5. Abnormal ac voltage at the FACP.
6. A break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at the FACP or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition.

10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

E. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP.

1.7 SUBMITTALS

A. Provide one copy of all of the below listed documentation, in excess of the number of copies required in Division 1, for review by the Authority Having Jurisdiction.

B. Product Data: For each item of equipment indicated and required, provide roughing-in diagrams and instructions for installation, operation, and maintenance suitable for inclusion in maintenance manuals. Include typical wiring diagrams for each item of fire alarm equipment being supplied. Include U. L. listings and all other information required by the Authority Having Jurisdiction.

C. Shop Drawings: Provide shop drawings showing equipment/device locations and connecting wiring of entire fire alarm and detection system, on floor plans. Include wiring and riser diagrams. Information pertaining to interface with existing facilities, and all existing facilities being reused, shall be indicated. Provide all documentation required for review, by Authority Having Jurisdiction, to allow review by Engineer prior to submission. Provide additional information needed for review, by Authority Having Jurisdiction, to determine how the complete system operates as a whole. No work, including rough-in, shall be started without review by the Engineer and the Authority Having Jurisdiction, and without shop drawings stamped by the State Fire Marshal.

1. Shop Drawings shall be prepared by persons with the following qualifications:

    a. Trained and certified by manufacturer in fire alarm system design.
    b. Fire alarm certified by NICET, minimum Level 3.

2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
3. System riser diagram with conduit sizes, and cable and wire types and sizes.
4. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
5. Batteries: Size calculations. Indicate impact by additions to the system on existing batteries and indicate actions taken if any.
6. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
7. Ductwork Coordination Drawings: Plans, sections, and elevations of ducts, drawn to scale and coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
8. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

G. Documentation:

1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner. Format of the written sequence of operation shall be the optional input/output matrix.

    a. Hard copies on paper to Owner.
    b. Electronic media may be provided to Owner.

H. Provide completed Review Request Form and check for payment of review fee, all as required by The Office of the State Fire Marshal.

1.8 QUALITY ASSURANCE

A. Installer:

1. An electrician or NICET Level 1 (or higher) Fire Alarm Technician shall install conduit for the fire alarm system.
2. An electrician or NICET Level 1 (or higher) Fire Alarm Technician shall be allowed to install wire or cable.
3. An electrician or NICET Level 1or higher Fire Alarm Technician shall be allowed to install and terminate fire alarm devices.
4. A NICET Level 3 (or higher) Fire Alarm Technician shall supervise the installation of the fire alarm system and shall terminate cabling in cabinets and panels.
5. A NICET Level 3 (or higher) Fire Alarm Technician shall program addressable systems and shall perform all specified tests and inspection; and shall prepare all specified reports.

B. Installer Qualifications: Where a NICET level Fire Alarm Technician is required to perform installation tasks, personnel shall be trained and certified by manufacturer for installation of units required for this Project.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.9 PROJECT CONDITIONS

A. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of fire alarm service.
2. Do not proceed with interruption of fire alarm service without Owner's written permission.

1.10 SEQUENCING AND SCHEDULING

A. Existing Fire Alarm Equipment: Maintain fully operational until new equipment has been tested and accepted.

1.11 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Smoke Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than 1 unit of each type.
2. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than 1 unit of each type.

PART 2 - PRODUCTS

2.1 EXISTING FIRE ALARM SYSTEM

A. Compatibility with Existing Equipment: Fire alarm system and components shall operate as an extension of an existing system.

B. Existing System: Edwards EST3.

2.2 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
3. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

5. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

B. Duct Smoke Detectors:

1. Photoelectric Smoke Detectors:

a. Sensor: LED or infrared light source with matching silicon-cell receiver.
b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

2. Ionization Smoke Detectors:

a. Sensor: Responsive to both visible and invisible products of combustion. Self-compensating for changes in environmental conditions.
b. Detector Sensitivity: Between 0.5 and 1.7 percent/foot (0.0016 and 0.0056 percent/mm) smoke obscuration when tested according to UL 268A.

3. UL 268A listed, operating at 24-V dc, nominal.
4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
5. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.

a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.

6. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
7. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
8. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
9. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.3 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to control panel of roof top units for unit shutdown.

2.4 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 degrees C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Connect new equipment to the existing control panel in the existing part of the building.
2. Expand, modify, and supplement the existing monitoring equipment as necessary to extend the existing monitoring functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.

B. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A.

B. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
2. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring

diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Basic Electrical Materials and Methods."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.

    a. Include the existing system in tests and inspections.

3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.

    a. Detectors that are outside their marked sensitivity range shall be replaced.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

END OF SECTION 16721