

**PROJECT MANUAL
BID DOCUMENTS – NOVEMBER 9, 2022**

**WARWICK HIGH SCHOOL
89 SANFORDVILLE ROAD
WARWICK, NEW YORK 10990**

**UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE
SED#44-21-01-06-0-001-042**

**WARWICK VALLEY CENTRAL SCHOOL DISTRICT
225 West Street, Warwick, New York 10990
ORANGE COUNTY**

**EISENBACH AND RUHNKE ENGINEERING, P.C.
PROJECT NUMBER 05-21-04**



THE ENGINEER THAT HAS SIGNED THIS DOCUMENT CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION AND BELIEF, THE PLANS AND SPECIFICATIONS ARE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE STATE ENERGY CONSERVATION CONSTRUCTION CODE, CONSTRUCTION STANDARDS OF THE COMMISSIONER OF EDUCATION, NEW YORK STATE DEPARTMENT OF LABOR PART 56 OF TITLE 12, AND UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ASBESTOS HAZARD EMERGENCY RESPONSE ACT REGULATIONS.

**DIVISIONS 00, 01, 05, 07, 09, 22, 23, 26, 28
EISENBACH AND RUHNKE ENGINEERING, P.C.
291 GENESEE STREET
UTICA, NEW YORK 13501
WWW.ERENGPC.COM
PH. 315-735-1916
FAX 315-735-6365**

**COPYRIGHT © EISENBACH AND RUHNKE ENGINEERING, P.C. 2021
ALL RIGHTS RESERVED**

**SECTION 00 0110
TABLE OF CONTENTS**

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 0110 - Table of Contents
- 00 0115 - List of Drawing Sheets
- 00 1113 - Advertisement for Bids
- 00 2113 - Instructions to Bidders
 - ATTACHMENT – AIA A701 2018
- 00 2114 - RFI Form
- 00 4100.1 - Bid Form – Contract #1 HVAC
- 00 4100.2 - Bid Form – Contract #2 ROOFING
- 00 4101 - Statement of Surety's Intent
- 00 4102 - Certificate of Non-Collusion
- 00 4336 - Proposed Subcontractors Form
- 00 4343 - Prevailing Wage Rates
- 00 4430 - Hold Harmless Agreement
- 00 4476 - Insurance Certification
- 00 4546 - Certification Regarding Iran Divestment Act
- 00 5000 - Contracting Forms and Supplements
- 00 5200 - Agreement Form
 - ATTACHMENT – AIA A101-2017
- 00 6000 - Project Forms
- 00 7200 - General Conditions
 - ATTACHMENT AIA A201-2017
- 00 7300 - Supplementary Conditions
- 00 7300A - Supplementary Conditions

SPECIFICATIONS

DIVISION 01 -- GENERAL REQUIREMENTS

- 01 1000 - Summary of Contract(s)
- 01 2000 - Price and Payment Procedures
- 01 2100 - Allowances
- 01 2300 - Alternates
- 01 3000 - Administrative Requirements
- 01 3060 - Non-Discrimination Clauses
- 01 3216 - Construction Progress Schedule
- 01 3300 - SED Special Requirements
- 01 3323 - Shop Drawings, Submittals, Product Data, and Samples
 - 01 3323.01 - Submittal Cover Sheet
- 01 4000 - Quality Requirements
- 01 4100 - Regulatory Requirements
- 01 4216 - Definitions
- 01 4219 - Reference Standards
- 01 5000 - Temporary Facilities and Controls
- 01 5060 - Site Safety
- 01 6000 - Product Requirements
- 01 7000 - Execution and Closeout Requirements
- 01 7329 - Cutting and Patching
- 01 7330 - Selective Removals
- 01 7419 - Construction Waste Management and Disposal
- 01 7800 - Closeout Submittals

DIVISION 05 – METAL FABRICATIONS

- 05 5000 - Metal Fabrications

DIVISION 07 – ROOFING, THERMAL AND MOISTURE PROTECTION

- 07 5010 - Modifications to Existing Roofing
- 07 8400 - Firestopping
- 07 9005 - Joint Sealers

DIVISION 09 – FINISHES

- 09 9000 - Paints and Coatings

DIVISION 22 -- PLUMBING

- 22 0500 - Common Work Results Plumbing
- 22 0529 - Hangers and Supports for Plumbing Piping and Equipment
- 22 0553 - Identification for Plumbing Piping and Equipment
- 22 1005 - Plumbing Piping

DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

- 23 0000 - General Provisions - Mechanical
- 23 0500 - Common Work Results HVAC
- 23 0513 - Common Motor Requirements for HVAC Equipment
- 23 0516 - Expansion Fittings and Loops for HVAC Piping
- 23 0517 - Sleeves and Sleeve Seals for HVAC Piping
- 23 0519 - Meters and Gauges for HVAC Piping
- 23 0523 - General Duty Valves for HVAC Piping
- 23 0529 - Hangers and Supports for HVAC Piping and Equipment
- 23 0548 - Vibration and Seismic Controls for HVAC
- 23 0553 - Identification for HVAC Piping and Equipment
- 23 0566 - Anti-Microbial Ultraviolet Emitters for HVAC Ducts and Equipment
- 23 0593 - Testing, Adjusting, and Balancing for HVAC
- 23 0713 - Duct Insulation
- 23 0719 - HVAC Piping Insulation
- 23 0800 - Commissioning of HVAC
- 23 0913 - Instrumentation and Control Devices for HVAC
- 23 0923 - Direct-Digital Control System for HVAC
- 23 0993 - Sequence of Operations for HVAC Controls
- 23 0995 - BACnet Building Automation System
- 23 2113 - Hydronic Piping
- 23 2114 - Hydronic Specialties
- 23 2300 - Refrigerant Piping
- 23 3100 - HVAC Ducts and Casings
- 23 3300 - Air Duct Accessories
- 23 3600 - Air Terminal Units
- 23 3700 - Air Outlets and Inlets
- 23 7416 - Packaged Rooftop Units
- 23 8113 - Packaged Terminal Air-Conditioners
- 23 8129 - Variable Refrigerant Flow HVAC Systems

DIVISION 26 -- ELECTRICAL

- 26 0000 - General Provisions – Electrical Contractor
- 26 0500 - Common Work Results Electrical
- 26 0501 - Summary of Work Electrical
- 26 0505 - Selective Demolition for Electrical
- 26 0519 - Low-Voltage Electrical Power Conductors and Cables
- 26 0526 - Grounding and Bonding for Electrical Systems
- 26 0529 - Hangers and Supports for Electrical Systems
- 26 0533.13 - Conduit for Electrical Systems
- 26 0533.16 - Boxes for Electrical Systems
- 26 0553 - Identification for Electrical Systems
- 26 0583 - Wiring Connections
- 26 2416 - Panelboards
- 26 2726 - Wiring Devices
- 26 2816.16 - Enclosed Switches

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY
28 4600 - Fire Detection and Alarm

END OF TABLE OF CONTENTS

SECTION 00 0115
LIST OF DRAWING SHEETS

PART 1 - GENERAL

1.01 DRAWING INDEX

- A. Drawings are listed on Cover Page for all work.
- B. Drawings are the property of the Engineer and shall not be used for any other purpose other than contemplated by the Drawings and Project Manual.

END OF LIST OF DRAWINGS

SECTION 00 1113
ADVERTISEMENT FOR BIDS

THE BOARD OF EDUCATION

**1.01 INVITES BIDS FOR WARWICK VALLEY CSD – HIGH SCHOOL – UNIT VENTILATOR
REPLACEMENT & AIR CONDITIONING UPGRADE**

- A. Sealed bids will be received by the Board of Education, at the Warwick Valley Central School District until 2:00 P.M. on the 29th of November at which time they will be publicly opened and read aloud.
- B. Bidding Documents may be examined at the office of the Engineer, Eisenbach & Ruhnke Engineering, P.C., 291 Genesee Street, Utica, New York 13501, telephone 315.735.1916, fax 315.735.6365.
- C. For the convenience of prospective Bidders, subcontractors and material suppliers, Bidding Documents will also be on file at the following locations:
 - 1. Dodge Data & Analytics: <http://dodgeprojects.construction.com>
 - 2. Plan Room at www.erengpc.com
 - 3. Bidnet: <http://bidnetdirect.com/new-york>
- D. A pre-bid conference and on-site review of the Project areas will be conducted by the Engineer on November 16, 2022, commencing at 3:30 P.M. at the Warwick District Offices, 225 West Street, Warwick, NY 10990.
- E. Visits to the sites may be arranged by contacting Than Harrington (845) 475-4311.
- F. Attention of the Bidder is particularly called to the Owner's sales tax exemption, the requirements as to conditions of employment to be observed and the minimum wage rates to be paid under the contract. In addition, the Bidding Documents for this project contain detailed requirements for the qualification of Bidders. These include, among other things, rigid bonding and insurance requirements, financial statements, bank references, lists of lawsuits, arbitrations or other proceedings in which the Bidder has been named as a party, a statement of surety's intent to issue Performance and Payment Bonds, and a description of other projects of similar size and scope completed by the Bidder.
- G. Bids shall be prepared as set forth in "Instructions to Bidders", enclosed in a sealed envelope bearing on its face the name and address of the Bidder and the title of the Work to which the bid enclosed relates.
- H. Each Bidder shall deposit with its bid, security in an amount not less than five percent (5%) of the base bid in the form and subject to the conditions provided in the "Instructions to Bidders."
- I. No Bidder may withdraw its bid within forty-five (45) days after the actual bid opening.
- J. The Board of Education reserves the right to waive any and all informalities in or to reject any or all bids.
- K. The Owner further reserves its right to disqualify Bidders for any material failure to comply with the "Instructions to Bidders" and "Supplementary Instructions to Bidders."

DATE: _____

BY: SUSAN LAROE, DISTRICT CLERK

WARWICK VALLEY CENTRAL SCHOOL DISTRICT

END OF BID SOLICITATION

SECTION 00 2113
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS APPLY TO THIS SECTION.

1.02 DOCUMENT INCLUDES

- A. Invitation
 - 1. Bid Submission
 - 2. Work Identified in the Contract Documents
 - 3. Contract Time
- B. Bid Documents and Contract Documents
 - 1. Definitions
 - 2. Contract Documents Identification
 - 3. Availability
 - 4. Examination
 - 5. Inquiries/Addenda
 - 6. Product/Assembly/System Substitutions
- C. Site Assessment
 - 1. Site Examination
 - 2. Prebid Conference
- D. Qualifications
 - 1. Qualifications
 - 2. Subcontractors/Suppliers/Others
- E. Bid Submission
 - 1. Bid Depository
 - 2. Submission Procedure
 - 3. Bid Ineligibility
- F. Bid Enclosures/Requirements
 - 1. Security Deposit
 - 2. Consent of Surety
 - 3. Performance Assurance
 - 4. Bid Form Requirements
 - 5. Bid Form Signature
 - 6. Insurance Certification
 - 7. Additional Bid Information
- G. Offer Acceptance/Rejection
 - 1. Duration of Offer
 - 2. Acceptance of Offer

1.03 RELATED DOCUMENTS

- A. Document 01 1000 - Summary of Contract.
- B. Document 00 1113 - Advertisement for Bids.
- C. Documents 00 4100.1 through 00 4100.2- Bid Forms
- D. Document 00 41 01 - Statement of Surety's Intent.
- E. Document 00 41 02 - Certificate of Non-Collusion.
- F. Document 00 4476 - Insurance Certification.
- F. Document 00 4546 - Certification Regarding the Iran Divestment Act
- G. Document 00 7300 - Supplementary Conditions
- H. Document 00 7300A - Supplementary Conditions

INVITATION

2.01 BID SUBMISSION

- A. Bids signed and under seal, executed, and dated will be received at the office of the Warwick Valley Central School District at 225 West Street, Warwick, NY 10990 before 2:00 P.M. local standard time on the 29th day of November 2022.
- B. Offers submitted after the above time shall be returned to the bidder unopened.
- C. Offers will be opened publicly immediately after the time for receipt of bids.

2.02 LUMP SUM BIDS

- A. Bids will be received for the following Prime Contracts:
 - 1. Unit Ventilator Replacement and Air Conditioning

2.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Work of this proposed Contract is as described in the specifications and on the drawings.
- B. Locations:
 - 1. High School, 89 Sanfordville Road, Warwick, NY 10990

2.04 CONTRACT TIME

- A. Owner requires that under the work of this contract be completed by October 2023.

2.05 BID DOCUMENTS AND CONTRACT DOCUMENTS

- A. Definitions: All definitions set forth in the General Conditions of the Contract and Section 01 4216 are applicable to these Instructions to Bidders.
- B. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

2.06 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as E&R Project Number 05-21-04, High School Unit Ventilator & Air Conditioning Upgrade as prepared by Eisenbach and Ruhnke Engineering, P.C. who is located at 291 Genesee Street, Utica, New York 13501, and with contents as identified in the Table of Contents.

2.07 AVAILABILITY

- A. Bid Documents may be obtained at the office of Eisenbach and Ruhnke Engineering, P.C. which is located at 291 Genesee Street, Utica, New York 13501.
- B. Bid Documents, on CD, in PDF format, will be available, at no cost, to all prospective bidders. The CD's will be available for a \$15 shipping fee if requested to be mailed.
- C. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

2.08 EXAMINATION

- A. Bid Documents may be viewed at the office of Eisenbach and Ruhnke Engineering, P.C.
- B. Bid Documents are on display at the offices of the following construction plan rooms:
 - 1. Dodge Data & Analytics: <http://dodgeprojects.construction.com>
 - 2. Bidnet: <<http://bidnetdirect.com/new-york>>
 - 3. Plan Room at ERENG.PC.COM.
- C. Upon receipt of Bid Documents verify that documents are complete. Notify Engineer should the documents be incomplete.
- D. Immediately notify Engineer upon finding discrepancies or omissions in the Bid Documents.

2.09 INQUIRIES/ADDENDA

- A. Direct questions to Jack Eisenbach at jeisenbach@erengpc.com and John Jouben at jjouben@erengpc.com; (315) 735-1916. Any and all questions about the interpretation or clarification of the Bid Documents, or about any other matter affecting the Work or pertaining to the bid must be directed in writing on the RFI form in Section 00 2114, to the Engineer.
- B. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.

- C. Verbal answers are not binding on any party.
- D. Clarifications requested by bidders must be in writing not less than 7 days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.
- E. Answers: The Engineer will issue addenda, if necessary, to answer each question. Bidders shall rely on answers contained in such addenda and shall not rely upon any oral answers given by any employee or agent of Owner, Engineer, and Engineer's Consultants.

2.10 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular product, bidders shall comply with the specifications, performance and quality of the specification item. The Engineer will not review any substitutions during the bidding period. The bidder assumes all responsibility to meet the requirements and the Engineer shall be final authority as to a product is equal to the specification.
- B. See Section 01 6000 - Product Requirements for additional requirements.

SITE ASSESSMENT

3.01 SITE EXAMINATION

- A. Bidders may inspect the site at the time of the pre-bid conference, if one is scheduled, or other times by advance agreement with the Owner. Bidders who do not inspect the site shall be nevertheless responsible for such information as might have been obtained from a reasonable site inspection.
- B. The bidder is required to contact Owner at the following address and phone number to arrange a date and time to visit the project site: Than Harrington (845) 475-4311.

3.02 PRE-BID CONFERENCE

- A. A bidders conference has been scheduled for 3:30 P.M. on the 16th day of November, 2022 at the location of the Warwick Valley CSD District Offices, 225 West Street, Warwick, New York.
- B. Representatives of Eisenbach and Ruhnke Engineering, P.C. will be in attendance.
- C. Attendance is Non-Mandatory. Bidders are strongly advised to attend.
- D. Summarized minutes of this meeting will be circulated to attendees. These minutes will form part of the Contract Documents.
- E. Information relevant to the Bid Documents will be recorded in an Addendum, issued to Bid Document recipients.

QUALIFICATIONS

4.01 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. Owner reserves the right to reject a proposed subcontractor for reasonable cause.
- B. Refer to General Conditions.

BID SUBMISSION

5.01 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with bidder's name, project name and Owner's name on the outside.
- C. Improperly completed information, irregularities in security deposit, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.
- D. Proposals must be submitted on the Form provided by the Engineer included in the project manual with all blanks appropriately filled in. They must be submitted in sealed envelopes bearing on the outside the name and address of the bidder title of the project and trade.
- E. To submit a bid for a bid package, the bidder should photocopy or remove the bid/proposal form for that bid package from the Project Manual. Then the bidder should complete, sign, and submit the form as required herein.

- F. All bid prices shall be filled in, both in words and figures. Signatures shall be in ink and in longhand. Proposals which are incomplete, conditional, or obscure may be rejected as informal. Additional copies of the Proposal Form will be furnished by the Architect upon request.
 - 1. In case of a discrepancy between the words and figures, the written word, not the figures, will govern.
- G. Bidders shall not rely on oral statements made by any employee or agent of the Owner, Engineer, Engineer's consultants, or Owner's Representative. Before submitting a proposal, bidders shall fully inform themselves as to all existing conditions and limitations and shall include in the Proposal a sum to cover the cost of all items included in the Contract.
- H. No oral or telephonic proposals or modifications of proposals will be considered.

5.02 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.
- B. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Owner, be declared unacceptable.
- C. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Owner, be waived.

BID ENCLOSURES/REQUIREMENTS

6.01 SECURITY DEPOSIT

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. Bid Bond of a sum no less than 5 percent of the Bid Amount on AIA A310 Bid Bond Form or certified check, including alternates.
- B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.
- C. The security deposit will be returned after delivery to the Owner of the required Performance and Payment Bond(s) by the accepted bidder.
- D. Include the cost of bid security in the Bid Amount.
- E. After a bid has been accepted, all securities will be returned to the respective bidders and other requested enclosures.
- F. If no contract is awarded, all security deposits will be returned.

6.02 CONSENT OF SURETY

- A. Submit with the Bid: Section 00 4101.

6.03 PERFORMANCE ASSURANCE

- A. Accepted Bidder: Provide a Performance and Payment bond as described in Document 00 7300 - Supplementary Conditions and the General Conditions. Prior to the execution of the Contract, the bidder to furnish bonds covering and faithful performance of the Contract and the payment of all obligations arising thereunder in such form and amount as the Owner may prescribe and with such sureties secured through the bidder's usual sources as may be agreeable to the parties.
- B. Include the cost of performance assurance bonds in the Bid Amount.
- C. The bidder shall require the attorney in fact who executes the required bonds on the behalf of the surety to affix thereto an original certified and current copy of his power of attorney indicating the monetary limit of such power.

6.04 INSURANCE

- A. Provide an executed "Undertaking of Insurance" on the form provided stating their intention to provide insurance to the bidder in accordance with the insurance requirements of the Contract Documents.

6.05 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.

6.06 SALES AND USE TAXES

- A. The Owner is a tax-exempt entity, so there shall be no charge for sales or use taxes. The Owner documents this status as requested.

6.07 FEES FOR CHANGES IN THE WORK

- A. Refer to General Conditions.

6.08 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:
1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.
 4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

6.09 EQUIVALENCY CLAUSE

- A. Where, in these specifications, certain kinds, types, brands, or manufacturers of material are named, they shall be regarded as the standard of quality. Where two or more are named, the Contractor may select one of those items, subject to meeting the requirements of the specified product. If the contractor desires to use any kind, type, brand, or manufacture of material other than those named in the specification, he shall indicate in writing, and prior to award of the contract, what kind, type, brand, or manufacture is included in the base bid for the specified items. Submit information describing in specific detail, wherein it differs from the quality and performance required by the base specifications, and such other information as may be required by the Owner. Contractor shall refer to Section 01 6000.

6.10 NON DISCRIMINATION

- A. All Contractors and Subcontractors of all tiers and all vendors shall comply with all pertinent provisions of the State, Local and Federal law against discrimination in employment practices.

6.11 PREVAILING WAGES

- A. Law required the payment of prevailing wages on the project, as listed in Section 00 4343.

6.12 ADDITIONAL BID INFORMATION

- A. Submit the following Supplements concurrent with bid submission.
1. Section 00 4101 - Statement of Surety's Intent
 2. Section 00 4102 - Certificate of Non-Collusion
 3. Section 00 4336 - Proposed Subcontractors Form
 4. Section 00 4430 - Hold Harmless Agreement
 5. Section 00 4476 - Insurance Certification
 6. Section 00 4546 - Certification Regarding the Iran Divestment Act

OFFER ACCEPTANCE/REJECTION

7.01 ACCEPTANCE OF OFFER

- A. Owner reserves the right to accept or reject any or all offers.
- B. The bidder acknowledges the right of the Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of the Owner, at its discretion to reject a bid if the bidder fails to furnish any required bid security, or to submit the information required by the bidding documents or if the bid is incomplete or irregular.
- C. After acceptance by Owner, Engineer on behalf of Owner, will issue to the successful bidder, a written Bid Acceptance.

7.02 POST-BID PROCEDURE

- A. The bid proposal, alternates, and the proposed subcontractors. Information received from owners of other projects all will be considered to determine whether the contractor is the "lowest responsible bidder" in making the award. The Owner and Engineer may make such investigation as the Owner deems necessary to determine the responsibility of any bidder or to determine the ability of any bidder to perform the Work.
- B. When requested by the Owner, bidders shall furnish all information and data required by the Owner within the time and in the form and manner requested by the Owner. Upon notification from the Owner, the apparent low bidder shall furnish, within three (3) working days after the bid opening, Two (2) copies of the following information in writing:
 1. Evidence of the bidder's financial responsibility, including a certified financial statement prepared by a certified public accountant. The financial statement shall include, but not limited to the following:
 - a. Current assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses):
 - b. Net Fixed Assets:
 - c. Other Assets:
 - d. Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes):
 - e. Other Liabilities (e.g., Capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).
 - f. The names, addresses and phone numbers of the subcontractors and suppliers that the bidder proposes to use on the project.
 - g. A bar-chart showing the bidder's proposed plan and schedule to complete the bidder's work in accordance with the milestones and phasing plan.
 - h. The insurance certificates required by the Bid Documents.
 - i. A proposed schedule of values for the bidder's work.
 - j. A proposed list of submittals and a proposed schedule for making them, all keyed to the bar-chart.
 2. After receipt of the above information, the Owner will designate a time and place for the meeting between the Owner and Architect and the apparent low bidder. The apparent low bidder's principal, project manager and site superintendent will attend that meeting, at which time the parties will discuss the bidder's responsiveness, responsibility, and qualifications.
 3. The Owner reserves the right to disapprove the use of any proposed Subcontractor, and in such event, the bidder shall submit the name of another Subcontractor in like manner within the time specified by the Owner, as set forth in of the Agreement.
 4. To the fullest extent allowed by law, the Owner reserves the right to reject any bid if the evidence required by the Owner is not submitted or fails to satisfy the Owner that the bidder is responsible, able and qualified to carry out the obligations of the Contract or to complete the Work as contemplated. The Owner will consider the information received in determining whether to accept a proposal.
 5. Acceptance of a proposal will be a notice in writing signed by a duly authorized representative of the Owner.
 6. Any bidder whose proposal is accepted will be required to sign the Owner/Contractor Agreement no later than ten (10) days after notification of Award of Bid or five (5) days following receipt of Contract, whichever is later.
 7. In the event that the Owner should reject the proposal of the bidder, the Owner may elect to meet with the next lowest bidder and to consider the information as provided above. In the event that the proposal of the next lowest bidder is rejected, the Owner may elect to meet with the third lowest bidder and repeat the above process. At all times the Owner retains the right to reject all bids.

END OF SECTION

DRAFT AIA® Document A701™ - 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

<< >>
<< >>
<< >>

THE OWNER:

(Name, legal status, address, and other information)

<< >>< >>
<< >>
<< >>
<< >>

THE ARCHITECT:

(Name, legal status, address, and other information)

<< >>< >>
<< >>
<< >>
<< >>

TABLE OF ARTICLES

- 1 DEFINITIONS
- 2 BIDDER'S REPRESENTATIONS
- 3 BIDDING DOCUMENTS
- 4 BIDDING PROCEDURES
- 5 CONSIDERATION OF BIDS
- 6 POST-BID INFORMATION
- 7 PERFORMANCE BOND AND PAYMENT BOND
- 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

<< >>

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper

documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

<< >>

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

<< >>

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

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

<< >>

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

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

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

§ 4.3 Submission of Bids

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

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

« »

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

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

« »

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

<< >>

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- 1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

- 2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

- 3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

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

(Insert the date of the E203-2013.)

<< >>

- 5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:

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

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

The Sustainability Plan:

Title	Date	Pages

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:

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

SECTION 00 2114

RFI FORM

CONTRACTOR'S REQUEST FOR INFORMATION NO. _____

E&R RFI NO: _____

NAME OF PROJECT:

**WARWICK VALLEY CSD HIGH SCHOOL UNIT VENTILATOR REPLACEMENT & AIR
CONDITIONING UPGRADE**

NAME OF OWNER: Warwick Valley Central School District

A/E PROJECT NO: 05-21-04

- A. ENGINEER: Eisenbach and Ruhnke Engineering, P.C.
291 Genesee Street
Utica, New York 13501

Phone: 315.735.1916 Fax: 315.735.6365 Email: jeisenbach@erengpc.com jjouben@erengpc.com
acorrell@erengpc.com

- B. FROM (CO. NAME): _____

DATE: _____

EMAIL/FAX NO. _____

CONTACT NAME: _____

SUBJECT: _____

DISCIPLINE/TRADE: _____

DWG./SPEC. REFERENCE: _____

QUESTION:

RESPONSE:

ENGINEER'S SIGNATURE: _____

DATE: _____

Note: review and any responses to this request for information by the architect/engineer is strictly for design intent only and does not constitute acknowledgement or acceptance of any cost or schedule implications unless specifically presented by the contractor. By submission of this request for information, the contractor assumes all responsibility in the absence of an approved change order or work directive.

END OF SECTION

SECTION 00 4100.1
BID FORM
CONTRACT #1 - HVAC

THE PROJECT AND THE PARTIES

TO:

Warwick Valley Central School District
225 West Street Ext.
Warwick, NY 10990

FOR:

HIGH SCHOOL – UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE

ENGINEER'S PROJECT NUMBER: 05-21-04

DATE: _____ (BIDDER TO ENTER DATE)

SUBMITTED BY:

Bidder's Full Name _____
Address _____
City, State, Zip _____
Contact Name _____ Phone _____
Employer Identification Number (EIN) _____

1.01 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Eisenbach and Ruhnke Engineirg, P.C. for the above-mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #1 HVAC Construction for the Sum of:

B. BASE BID

1. The Base Bid of this proposal for all work required by the Contract Documents for Contract #1 HVAC is as follows:

(\$ _____) DOLLARS

C. ALLOWANCE(S)

1. The Total Allowance as indicated in Section 01 2100 - Allowances is as follows:

(\$ _____) DOLLARS

D. TOTAL BASE BID

1. The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #1 HVAC is as follows:

(\$ _____) DOLLARS

(The Total Base Bid is sum of 1.01.B1 and 1.01.C.1)

E. ALTERNATE H-1

1. The Alternate(s) for this Proposal required by the Contract Documents are listed in Section 01 2300.
 - a. The base bid includes the replacement of unit ventilators as indicated on the Drawings and related work.
 - b. The alternate is for the contractor to replace the units indicated on the Drawings as an alternate.

(\$ _____) DOLLARS

- F. The undersigned further understands and agrees that he is to furnish and provide all necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Base Bid stated, modified by such additive or deductive alternatives, if any are accepted by the Owner.
- G. All Allowances described in Section 01 2100 are included in Bid Sum.
- H. We have included the required security deposit as required by the Instruction to Bidders.
- I. All applicable federal taxes are included, and State of New York taxes are included in the Bid Sum.

1.02 ACCEPTANCE

- A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.
- B. If this bid is accepted by Warwick Valley CSD within the time period stated above, the Contractor will:
 1. Execute the Agreement within seven days of receipt of Notice of Award.
 2. Furnish the required bonds within seven days of receipt of Notice of Award.
- C. If this bid is accepted within the time stated, and the Contractor fails to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Warwick Valley CSD by reason of the Contractor's failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.03 REJECTION OF BIDS

- A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids.

1.04 CONTRACT TIME

- A. If this Bid is accepted, the Contractor will:
 1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in Section 01 1000 Summary of Contract. Failure to complete each phase of work by dates indicated will result in damages being assessed as stated in the Bidding Requirements.

1.05 CHANGES TO THE WORK

- A. Refer to General Conditions.

1.06 ADDENDA

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

1.07 BID FORM SUPPLEMENTS

- A. The following information is included with Bid submission:
 - 1. Document 00 4101 - Statement of Surety's Intent.
 - 2. Document 00 4336 - List of Subcontractors
 - 3. Document 00 4430 - Hold Harmless Agreement.
 - 4. Document 00 4546 - Certification Regarding the Iran Disinvestment Act
 - 5. Document 00 4476 - Insurance Certification.
 - 6. Section 00 6000 - Project Forms Bid Bond.

1.08 NON-COLLUSIVE BIDDING CERTIFICATION

- A. By submission of this bid or proposal:
 - 1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of his/her knowledge and belief:
 - a. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.
 - b. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor.
 - c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.09 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

- A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
 - 1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.
 - 2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
 - 3. That said bidder is not in arrears to the Warwick Valley CSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Warwick Valley CSD
 - 4. That no member of the Warwick Valley CSD or any officer or employee of the Warwick Valley CSD or person whose salary is payable in whole or in part from the Warwick Valley CSD treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
 - 5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.
 - 6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.10 BID FORM SIGNATURE(S)

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

(Authorized signing officer, Title)

(Seal)

(Authorized signing officer, Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Subscribed and sworn before me this day of ____ 20____

Notary Public: _____

My Commission Expire: _____

SECTION 00 4100.2
BID FORM
CONTRACT #2 – ROOFING

THE PROJECT AND THE PARTIES

TO:

Warwick Valley Central School District
225 West Street Ext.
Warwick, NY 10990

FOR:

HIGH SCHOOL – UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE

ENGINEER'S PROJECT NUMBER: 05-21-04

DATE: _____ (BIDDER TO ENTER DATE)

SUBMITTED BY:

Bidder's Full Name _____

Address _____

City, State, Zip _____

Contact Name _____ Phone _____

1.01 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bidding Requirements and the Contract Documents prepared by Eisenbach and Ruhnke Engineerig, P.C. for the above-mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform Contract #2 Roofing Construction for the Sum of:

B. BASE BID

1. The Base Bid of this proposal for all work required by the Contract Documents for Contract #2 Roofing Construction is as follows:

(\$ _____) DOLLARS

C. ALLOWANCE(S)

1. The Total Allowance as indicated in Section 01 2100 - Allowances is as follows:

(\$ _____) DOLLARS

D. TOTAL BASE BID

1. The Total Base Bid of this Proposal for all work required by the Contract Documents for Contract #2 Roofing Construction is as follows:

(\$ _____) DOLLARS

(The Total Base Bid is sum of 1.01.B1 and 1.01.C.1)

E. ALTERNATE R-1

1. The Alternate(s) for this Proposal required by the Contract Documents are listed in Section 01 2300.
 - a. The base bid includes the roofing related to providing the new VRF condensers on the roof.
 - b. The alternate is for the roofing related to the alternate VRF Condensers.

(\$ _____) DOLLARS

F. The undersigned further understands and agrees that he is to furnish and provide all necessary material, machinery, plant, implements, tools, labor, services, skill and other items of whatever nature required, and to do and perform all the work necessary under the Contract, to complete the work in accordance with the drawings and specifications and any addenda thereto, and to accept in full compensation therefore the amount of the Total Base Bid stated, modified by such additive or deductive alternatives, if any are accepted by the Owner.

G. All Allowances described in Section 01 2100 are included in Bid Sum.

H. We have included the required security deposit as required by the Instruction to Bidders.

I. All applicable federal taxes are included, and State of New York taxes are included in the Bid Sum.

1.02 ACCEPTANCE

A. This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the bid closing date.

B. If this bid is accepted by Warwick Valley CSD within the time period stated above, the Contractor will:

1. Execute the Agreement within seven days of receipt of Notice of Award.
2. Furnish the required bonds within seven days of receipt of Notice of Award.

C. If this bid is accepted within the time stated, and the Contractor fails to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Warwick Valley CSD by reason of the Contractor's failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

1.03 REJECTION OF BIDS

A. The undersigned agrees that the Owner shall have the right to accept or reject any or all bids.

1.04 CONTRACT TIME

A. If this Bid is accepted, the Contractor will:

1. Complete all the work covered by this Proposal with a commencement date of NO EARLIER THAN Award of Contract by Owner. Work shall be phased as indicated in Section 01 1000 Summary of Contract. Failure to complete each phase of work by dates indicated will result in damages being assessed as stated in the Bidding Requirements.

1.05 CHANGES TO THE WORK

A. Refer to General Conditions.

1.06 ADDENDA

A. The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

1. Addendum # _____ Dated _____.
2. Addendum # _____ Dated _____.
3. Addendum # _____ Dated _____.

1.07 BID FORM SUPPLEMENTS

- A. The following information is included with Bid submission:
1. Document 00 4101 - Statement of Surety's Intent.
 2. Document 00 4336 - List of Subcontractors
 3. Document 00 4430 - Hold Harmless Agreement.
 4. Document 00 4546 - Certification Regarding the Iran Disinvestment Act
 5. Document 00 4476 - Insurance Certification.
 6. Section 00 6000 - Project Forms Bid Bond.

1.08 NON-COLLUSIVE BIDDING CERTIFICATION

- A. By submission of this bid or proposal:
1. The undersigned bidder and the person or persons signing on behalf of the bidder, and should this bid be a joint bid, each party thereto, certifies as to its own organization, under penalty of perjury, that to the best of his/her knowledge and belief:
 - a. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.
 - b. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor.
 - c. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

1.09 BIDDER'S FURTHER AFFIRMATION AND DECLARATION

- A. The above name bidder and should this bid be a joint bid each party thereto, further affirm and declares:
1. That said bidder is of lawful age and the only one interested in this bid; and that no other person, firm or corporation, except those herein above named, has any interest in this bid or in the contract proposed to be entered into.
 2. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same work, and is in all respects fair and without collusion or fraud.
 3. That said bidder is not in arrears to the Warwick Valley CSD upon debt or contract, and is not a defaulter, as surety or otherwise upon any obligation to the said Warwick Valley CSD
 4. That no member of the Warwick Valley CSD or any officer or employee of the Warwick Valley CSD or person whose salary is payable in whole or in part from the Warwick Valley CSD treasury, or the spouse of any foregoing is or shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this bid, or in the performance of the Contract, or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof.
 5. That he/she has carefully examined the site of the work and that, from his/her own investigations, he/she has satisfied him/herself as to the nature and location of the work, and character, quality and quantity of materials, and all difficulties likely to be encountered, the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other items which may, in any way, affect the work or its performance.
 6. That if a corporation, this bid or proposal containing the Non-Collusive Binding Certification and the foregoing Affirmation and Declaration has been authorized by the Board of Directors of such Corporation, which authorization includes the signing and submission of this bid or proposal and the inclusion therein of the said Certificate of Non-Collusion and Affirmation and Declaration as the Act and Deed of the Corporation.

1.10 BID FORM SIGNATURE(S)

The Corporate Seal of

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

(Authorized signing officer, Title)

(Seal)

(Authorized signing officer, Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

Subscribed and sworn before me this day of ____ 20____

Notary Public: _____

My Commission Expire: _____

**SECTION 00 4101
STATEMENT OF SURETY'S INTENT**

TO: _____
(OWNER)

We have reviewed the Bid of _____
(Contractor)

OF _____
(Address)

FOR _____
(Project)

BIDS FOR WHICH WILL BE RECEIVED ON _____ (BID OPENING DATE), AND WISH TO ADVISE THAT SHOULD THIS BID OF THE CONTRACTOR BE ACCEPTED AND THE CONTRACT AWARDED TO HIM IT IS OUR PRESENT INTENTION TO BECOME SURETY ON THE PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND REQUIRED BY THE CONTRACT.

Any arrangement for the Bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if for any reason we do not execute the requisite Bonds.

We are duly licensed to sell surety bonds in the State of New York.

ATTEST:

Surety's Authorized Signature(s)

ATTACH POWER OF ATTORNEY

(CORPORATE SEAL, IF ANY. IF NO SEAL, WRITE "NO SEAL" ACROSS THIS PLACE AND SIGN)

(THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID)

END OF SECTION

**SECTION 00 4102
CERTIFICATE OF NON-COLLUSION**

TO _____, IN ACCORDANCE WITH SEALED BIDS FOR

**WARWICK VALLEY CSD
HIGH SCHOOL
UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE**

**SUBMITTED UNDER DATE OF _____ SECTION 103D OF THE
GENERAL MUNICIPAL LAW, AS AMENDED, THE BIDDER CERTIFIES THAT:**

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization under penalty of perjury, that to the best of their knowledge and belief:
- B. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
- C. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
- D. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

COMPANY: _____

BY: _____

Representative

END OF SECTION

SECTION 00 4336
PROPOSED SUBCONTRACTORS FORM

PARTICULARS

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

(BIDDER) _____

1.02 TO (OWNER): WARWICK VALLEY CENTRAL SCHOOL DISTRICT

DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

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

LIST OF SUBCONTRACTORS

A. COMPANY NAME: _____

CONTACT NAME/EMAIL: _____

CONTACT NUMBER: _____

SCOPE OF SERVICES: _____

B. COMPANY NAME: _____

CONTACT NAME/EMAIL: _____

CONTACT NUMBER: _____

SCOPE OF SERVICES: _____

C. COMPANY NAME: _____

CONTACT NAME/EMAIL: _____

CONTACT NUMBER: _____

SCOPE OF SERVICES: _____

D. COMPANY NAME: _____

CONTACT NAME/EMAIL: _____

CONTACT NUMBER: _____

SCOPE OF SERVICES: _____

END OF SECTION

**SECTION 00 4343
PREVAILING WAGE RATES**

PART ONE

1.01 RELATED DOCUMENTS

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

1.02 PROVISIONS OF LAW DEEMED INSERTED

- A. Each and every provision of law and clauses required by law to be inserted in the Contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the Contract shall forthwith be physically amended to make such insertion.
- B. The Contractor and subcontractors shall comply with applicable provisions of the Labor Law and all other state laws and Federal and Local statutes ordinances, codes, rules and regulations and orders which are applicable to the performance of this contract. The Contractor shall likewise require all subcontractors to comply therewith. The attention of the Contractor is particularly, but not exclusively, directed to Sections 220 through 223 of the New York State Labor Law and Sections 109 of the New York State Municipal Corporations Law and the following:
 - 1. The Contractor shall post the prevailing wages in a conspicuous place on the job site.
 - 2. Posters shall list the Department of Labor's Public work field offices with telephone numbers.
- C. All contractors and subcontractors shall furnish each of its workers with written notification of the applicable prevailing wage rates and supplements at the commencement of and at periodic intervals during the performance of the Work as required by the New York Labor Law
- D. The Contractor shall provide and keep certified payroll records at the job site.
- E. NOTE THESE WAGE RATES ARE EFFECTIVE UNTIL JUNE 30, of each year. Updated schedules will be available on the Department of Labor web site: www.labor.state.ny.us

END OF SECTION



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Warwick Valley CSD
Jack Eisenbach, President
Eisenbach & Ruhnke Engineering
291 Genesee Street
Utica NY 13501

Schedule Year 2022 through 2023
Date Requested 09/27/2022
PRC# 2022011076

Location 10 Park Avenue
Project ID#
Project Type Replace windows at Park Avenue Elementary School

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2022 through June 2023. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

**SECTION 00 4430
HOLD HARMLESS AGREEMENT**

**HEREIN THE "CONTRACTOR"
ASSUMES RESPONSIBILITY FOR ANY AND ALL INJURY TO OR DEATH OF ANY AND ALL PERSONS, ALL INJURY TO OR DEATH OF ANY AND ALL PERSONS, INCLUDING THE CONTRACTOR'S AGENTS, SERVANTS AND EMPLOYEES, AND IN ADDITION THERETO, FOR ANY AND ALL DAMAGES TO PROPERTY CAUSED BY OR RESULTING FROM OR ARISING OUT OF ANY ACT OR OMISSION IN CONNECTION WITH THIS CONTRACT OR THE PROSECUTION OF WORK HEREUNDER, WHETHER CAUSED BY THE CONTRACTOR OR THE CONTRACTOR'S AGENTS, SERVANTS OR EMPLOYEES, OR THE CONTRACTOR'S SUBCONTRACTORS OR SUPPLIERS, AND THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER, THE SCHOOL DISTRICT, AND THE (ENGINEER/ARCHITECT) EISENBACH AND RUHNKE ENGINEERING, P.C. FROM AND AGAINST ANY AND ALL LOSS AND/OR EXPENSE WHICH THEY OR EITHER OF THEM MAY SUFFER OR PAY AS A RESULT OF CLAIMS OR SUITS DUE TO, BECAUSE OF OR ARISING OUT OF ANY AND ALL SUCH INJURIES, DEATHS AND/OR DAMAGE. THE CONTRACTOR IF REQUESTED, SHALL ASSUME AND DEFEND AT THE CONTRACTOR'S OWN EXPENSE, ANY SUIT, ACTION OR OTHER LEGAL PROCEEDINGS ARISING THERE FROM, AND THE CONTRACTOR HEREBY AGREES TO SATISFY, PAY AND CAUSE TO BE DISCHARGED OF RECORD ANY JUDGMENT WHICH MAY BE RENDERED AGAINST THE OWNER OR ARCHITECT ARISING THEREFROM.**

DATED AT _____ THIS DAY OF 202_____.

SIGNED, SEALED AND DELIVERED SIGNED

IN THE PRESENCE OF: BY:

END OF SECTION

SECTION 00 4476
INSURANCE CERTIFICATION

BID OR PROJECT NO. # _____

NAME OF PROJECT: HIGH SCHOOL UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE

INSURANCE REPRESENTATIVE'S ACKNOWLEDGEMENT:

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

INSURANCE REPRESENTATIVE: _____

ADDRESS: _____

Are you an agent for the companies providing the coverage?

Yes _____ No _____

DATE: _____

Insurance Representative

BIDDER'S ACKNOWLEDGEMENT:

I acknowledge that I have received the insurance requirements of this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that a certificate of insurance must be submitted with my contract and if it is not, the Warwick Valley Central School District will reject my bid and award to the next lowest bidder.

FIRM NAME:

ADDRESS:

DATE: _____

Bidder's Signature: _____

END OF SECTION

SECTION 00 4546

CERTIFICATION REGARDING THE IRAN DIVESTMENT ACT

WARWICK VALLEY CSD E&R PROJECT NO. 05-21-04
HIGH SCHOOL - UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE

1.01 CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

- A. As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.
- B. By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).
- C. Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.
- D. During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

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

SIGNED
SWORN to before me this _____ day of _____ 202____

Notary Public: _____

OR

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

WARWICK VALLEY CSD E&R PROJECT NO. 05-21-04
HIGH SCHOOL - UNIT VENTILATOR REPLACEMENT & AIR CONDITIONING UPGRADE

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

Name of the Bidder: _____

Address of Bidder _____

Has bidder been involved in investment activities in Iran? _____

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

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

Have the investment activities ended? _____

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

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

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

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

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

I, _____ BEING DULY SWORN, DEPOSES AND SAYS THAT HE/SHE IS THE
_____ OF THE _____ CORPORATION AND
THE FOREGOING IS TRUE AND ACCURATE.

SIGNED

SWORN to before me this _____ day of _____ 202__

Notary Public: _____

END OF SECTION

SECTION 00 5000
CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

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

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 00 5200 - Agreement Form for the Agreement form to be executed.
- B. See Section 00 7200 - General Conditions for the General Conditions.
- C. See Section 00 7300 - Supplementary Conditions for the Supplementary Conditions.
- D. The Agreement is based on AIA A101-2017.
- E. The General Conditions are based on AIA A201-2017.

1.03 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
- B. Bond Forms:
 - 1. Bid Bond Form: AIA A310.
 - 2. Performance and Payment Bond Form: AIA A312.
- C. Clarification and Modification Forms:
 - 1. Architect's Supplemental Instructions Form: AIA G710-2017.
 - 2. Construction Change Directive Form: AIA G714-2017.
 - 3. Change Order Form: AIA G701.
- D. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

1.04 REFERENCE STANDARDS

- A. AIA A101-2007 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2007.
- B. AIA A201- General Conditions of the Contract for Construction; 2017.
- C. AIA A310 - Bid Bond; 2010.
- D. AIA A312 - Performance Bond and Payment Bond; 2010.
- E. AIA G701 - Change Order; 2017.
- F. AIA G704 - Certificate of Substantial Completion; 2017.
- G. AIA G710- Architect's Supplemental Instructions; 2017.
- H. AIA G710 - Architect's Supplemental Instructions; 2017.
- I. AIA G714- Construction Change Directive; 2017.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 5200
AGREEMENT FORM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.01 FORM OF AGREEMENT

- A. The agreement to be executed is attached following this page.

1.03 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions.
- B. Section 00 7300 & 00 7300A - Supplementary Conditions.
- C. Section 01 4216 - Definitions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DRAFT AIA® Document A101® - 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

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

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

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

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

The Owner and Contractor agree as follows.

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

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

(Check one of the following boxes.)

- [« »] The date of this Agreement.
- [« »] A date set forth in a notice to proceed issued by the Owner.
- [« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)
- [« »]

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

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

§ 3.3 Substantial Completion

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

(Check one of the following boxes and complete the necessary information.)

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

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

§ 4.4 Unit prices, if any:

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

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

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

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

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

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

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

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

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

« »

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

<< >>

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

<< >>

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

<< >>

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

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

§ 5.2 Final Payment

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

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

<< >>

§ 5.3 Interest

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

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

<< >> % << >>

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

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

<< >>

<< >>

<< >>
<< >>

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

Arbitration pursuant to Section 15.4 of AIA Document A201–2017

Litigation in a court of competent jurisdiction

Other *(Specify)*

<< >>

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

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

<< >>

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

<< >>
<< >>
<< >>
<< >>
<< >>
<< >>
<< >>

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

<< >>
<< >>
<< >>
<< >>
<< >>
<< >>
<< >>

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

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

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

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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

<< >>

§ 8.7 Other provisions:

<< >>

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

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

<< >>

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

.8 Other Exhibits:

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

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

Document	Title	Date	Pages

- .9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

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

OWNER (Signature)

« »« »

(Printed name and title)

CONTRACTOR (Signature)

« »« »

(Printed name and title)

DRAFT AIA® Document A101® – 2017

Exhibit A

Insurance and Bonds

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

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

« »
« »

THE OWNER:
(Name, legal status and address)

« »« »
« »

THE CONTRACTOR:
(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

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

§ A.2.2 Liability Insurance

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

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

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ A.2.3 Required Property Insurance

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

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

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

Causes of Loss	Sub-Limit

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

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

Coverage	Sub-Limit

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

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

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

§ A.2.3.3 Insurance for Existing Structures

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

§ A.2.4 Optional Extended Property Insurance.

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

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

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

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

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

[« »] § A.2.5.1 **Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

« »

[« »] § A.2.5.2 **Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

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

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

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

§ A.3.2 Contractor's Required Insurance Coverage

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

« »

§ A.3.2.2 Commercial General Liability

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

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

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

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

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

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

§ A.3.2.5 Workers' Compensation at statutory limits.

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

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

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

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

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

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

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

§ A.3.3 Contractor's Other Insurance Coverage

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

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

« »

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

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

- [« »] § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below: *(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

« »

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

Coverage

Limits

§ A.3.4 Performance Bond and Payment Bond

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

(Specify type and penal sum of bonds.)

Type

Penal Sum (\$0.00)

Payment Bond

Performance Bond

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

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

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

<< >>

SECTION 00 6000
PROJECT FORMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Attorney-in-fact who execute said bonds on behalf of a surety must affix thereto a certified and effectively dated copy of their Power of Appointment and Certification of an officer of the surety that the Power of Attorney continues in effect.

1.02 BID BOND:

- A. A Bid Bond will be required for this project. The American Institute of Architects Document A310, February 2010 edition entitled "Bid Bond" shall be the contract bond form for this project. Each individual bid shall be accompanied by a check upon a duly authorized State, National Bank or Trust Company, duly certified in the sum equal to FIVE (5%) percent of the total amount of the bid including alternates, or a Bid Bond in the amount of FIVE (5%) of the bid, including alternates, payable to the Owner, and shall be enclosed in an envelope containing the bid; as a guarantee that the Bidder will, after the award is made to him, enter into a bona fide contract with the Owner for the work, and furnish the bonds and liability policies as required under the specifications. If, for any reason, whatsoever, the Bidder fails to enter into a proper contract and to execute the proper bonds, as required by these specifications, the amount of said guarantee be retained by the Owner shall be the difference between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work.
 - 1. Each bid bond must also be accompanied by the written consent of the Surety Company authorized to do business in the State of New York and be Best "Secured" rated or better.
- B. All certified checks, except the check of the Bidder to whom a contract is awarded, will be returned to the respective Bidders, as soon as the Letter of Award has been issued by the Owner.
 - 1. The check of the Bidder, to whom a contract has been awarded, shall be retained until the contract has been executed and all bonds together with an approved liability insurance policy are filed with the Owner.

1.03 PERFORMANCE AND PAYMENT BOND:

- A. A Performance and Labor and Material Payment Bond will be required for this project. The bond premiums will be paid for by the Contractor.
- B. The American Institute of Architects, AIA Document A312, 2010 edition, entitled "Performance Bond" and AIA Document A312, 2010 edition, entitled "Payment Bond" and shall be the contract bond form for this project. AIA Document A311 is not acceptable.
- C. Each bond shall be a sum equal to One Hundred (100%) of the Contract Sum and shall be in a form satisfactory to the Owner and shall be underwritten by a surety company authorized to do business in the State of New York.
- D. Every Bond under this paragraph must display the Surety's Bond Number.
- E. Each bond must be accompanied by an original Power of Attorney, giving the name of attorneys in fact and extent of bonding capacity.
- F. The Surety Company shall be obligated for the bonds for a two-year period after substantial completion.
- G. All Surety Companies shall be permitted to do business in the State of New York and be A.M. Best Rating of "A" or better as to Policy Holder Ratings and "VII" or better as to Financial Size Category.
- H. A rider including the following provisions shall be attached to each Bond
 - 1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change or other modification of the Contract Documents. Such addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of

either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder ad notice to the Surety of such matters is hereby waived.

2. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner and the Owner shall have thirty (30) days from the time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first-class postage prepaid other means recognized by the court of jurisdiction to Owner.
3. Surety agrees that it is obligated under the bonds to any successor, grantee or assignee of the Owner.

END OF SECTION

SECTION 00 7200
GENERAL CONDITIONS

FORM OF GENERAL CONDITIONS

1.01 RELATED DOCUMENTS

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

1.01 FORM OF GENERAL CONDITIONS

- A. The general conditions applicable to this contract are attached following this page.

1.03 RELATED REQUIREMENTS

- A. Section 00 5200 - Agreement Form
- B. Section 00 7300 & 00 7300A- Supplementary Conditions.
- C. Section 01 4216 - Definitions.

END OF SECTION

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

<< >>
<< >>

THE OWNER:

(Name, legal status and address)

<< >>< >>
<< >>

THE ARCHITECT:

(Name, legal status and address)

<< >>< >>
<< >>

TABLE OF ARTICLES

- | | |
|----|--|
| 1 | GENERAL PROVISIONS |
| 2 | OWNER |
| 3 | CONTRACTOR |
| 4 | ARCHITECT |
| 5 | SUBCONTRACTORS |
| 6 | CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS |
| 7 | CHANGES IN THE WORK |
| 8 | TIME |
| 9 | PAYMENTS AND COMPLETION |
| 10 | PROTECTION OF PERSONS AND PROPERTY |
| 11 | INSURANCE AND BONDS |
| 12 | UNCOVERING AND CORRECTION OF WORK |
| 13 | MISCELLANEOUS PROVISIONS |
| 14 | TERMINATION OR SUSPENSION OF THE CONTRACT |
| 15 | CLAIMS AND DISPUTES |

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

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

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



ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

INDEX

(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, **12.3**

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

Arbitration

8.3.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,

9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,

13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,

4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,

9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,

7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,

13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,

3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,

3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,

9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,

15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

Building Information Models Use and Reliance

1.8

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7,

9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval

13.4.4

Certificates of Insurance
9.10.2
Change Orders
1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3,
7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1,
9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2
Change Orders, Definition of
7.2.1
CHANGES IN THE WORK
2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1,
11.5
Claims, Definition of
15.1.1
Claims, Notice of
1.6.2, 15.1.3
CLAIMS AND DISPUTES
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1
Claims for Additional Cost
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**
Claims for Additional Time
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**
Concealed or Unknown Conditions, Claims for
3.7.4
Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3,
11.3.2, 14.2.4, 15.1.7
Claims Subject to Arbitration
15.4.1
Cleaning Up
3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3,
6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**
Commencement of the Work, Definition of
8.1.2
Communications
3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1,
9.10, 12.2, 14.1.2, 15.1.2
COMPLETION, PAYMENTS AND
9
Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1,
9.10.3, 12.2, 15.1.2
Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1,
13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8,
15.4.2, 15.4.3
Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3
Conditions of the Contract
1.1.1, 6.1.1, 6.1.4
Consent, Written
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2,
15.4.4.2

Consolidation or Joinder
15.4.4
CONSTRUCTION BY OWNER OR BY
SEPARATE CONTRACTORS
1.1.4, **6**
Construction Change Directive, Definition of
7.3.1
Construction Change Directives
1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**,
9.3.1.1
Construction Schedules, Contractor's
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2
Contingent Assignment of Subcontracts
5.4, 14.2.2.2
Continuing Contract Performance
15.1.4
Contract, Definition of
1.1.2
CONTRACT, TERMINATION OR
SUSPENSION OF THE
5.4.1.1, 5.4.2, 11.5, **14**
Contract Administration
3.1.3, 4, 9.4, 9.5
Contract Award and Execution, Conditions Relating
to
3.7.1, 3.10, 5.2, 6.1
Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3
Contract Documents, Definition of
1.1.1
Contract Sum
2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4,
9.1, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2,
12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**
Contract Sum, Definition of
9.1
Contract Time
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5,
7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1,
8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2,
14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5
Contract Time, Definition of
8.1.1
CONTRACTOR
3
Contractor, Definition of
3.1, **6.1.2**
Contractor's Construction and Submittal
Schedules
3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2
Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3, 11.3, 14.1, 14.2.1.1
Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors
and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7,
9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,
3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2,
7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3,
11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the
Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents
3.2

Contractor's Right to Stop the Work
2.2.2, 9.7

Contractor's Right to Terminate the Contract
14.1

Contractor's Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,
9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent
3.9, 10.2.6

Contractor's Supervision and Construction
Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications
1.5, 2.3.6, 3.11

Copyrights
1.5, **3.17**

Correction of Work
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3,
15.1.3.1, 15.1.3.2, 15.2.1

Correlation and Intent of the Contract Documents
1.2

Cost, Definition of
7.3.4

Costs
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,
7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2,
12.1.2, 12.2.1, 12.2.4, 13.4, 14

Cutting and Patching
3.14, 6.2.5

Damage to Construction of Owner or Separate
Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2,
11.3, 14.2.4, 15.1.7

Damages for Delay
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

Date of Commencement of the Work, Definition of
8.1.2

Date of Substantial Completion, Definition of
8.1.3

Day, Definition of
8.1.4

Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4,
7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2,
14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance,
Rejection and Correction of
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3,
9.10.4, 12.2.1

Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1,
6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

Delays and Extensions of Time
3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**,
10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

Digital Data Use and Transmission
1.7

Disputes
6.3, 7.3.9, 15.1, 15.2

Documents and Samples at the Site
3.11

Drawings, Definition of
1.1.5

Drawings and Specifications, Use and Ownership of
3.11

Effective Date of Insurance
8.2.2

Emergencies
10.4, 14.1.1.2, **15.1.5**

Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,
10.4, 14.3, 15.1.6, **15.2.5**

Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work
(See Defective or Nonconforming Work)

Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4

GENERAL PROVISIONS

1

Governing Law

13.1

Guarantees (See Warranty)

Hazardous Materials and Substances

10.2.4, 10.3

Identification of Subcontractors and Suppliers

5.2.1

Indemnification

3.17, 3.18, 9.6.8, 9.10.2, 10.3.3, 11.3

Information and Services Required of the Owner

2.1.2, 2.2, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Initial Decision

15.2

Initial Decision Maker, Definition of

1.1.8

Initial Decision Maker, Decisions

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Injury or Damage to Person or Property

10.2.8, 10.4

Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders

1.1.1

Instructions to the Contractor

3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

Instruments of Service, Definition of

1.1.7

Insurance

6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, 11

Insurance, Notice of Cancellation or Expiration

11.1.4, 11.2.3

Insurance, Contractor's Liability

11.1

Insurance, Effective Date of

8.2.2, 14.4.2

Insurance, Owner's Liability

11.2

Insurance, Property

10.2.5, 11.2, 11.4, 11.5

Insurance, Stored Materials

9.3.2

INSURANCE AND BONDS

11

Insurance Companies, Consent to Partial Occupancy

9.9.1

Insured loss, Adjustment and Settlement of

11.5

Intent of the Contract Documents

1.2.1, 4.2.7, 4.2.12, 4.2.13

Interest

13.5

Interpretation

1.1.8, 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written

4.2.11, 4.2.12

Judgment on Final Award

15.4.2

Labor and Materials, Equipment

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes

8.3.1

Laws and Regulations

1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Liens

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of

12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability

3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1

Limitations of Time

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5

Materials, Hazardous

10.2.4, 10.3

Materials, Labor, Equipment and

1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Mediation

8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, 15.3, 15.4.1, 15.4.1.1

Minor Changes in the Work

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, 7.4

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, 12.3

Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4,
12.2

Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4,
3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4,
8.2.2 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1,
13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5,
15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance
11.1.4, 11.2.3

Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6,
15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections
13.4.1, 13.4.2

Observations, Contractor's
3.2, 3.7.4

Occupancy
2.3.1, 9.6.6, 9.8

Orders, Written
1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2,
14.3.1

OWNER 2

Owner, Definition of
2.1.1

Owner, Evidence of Financial Arrangements
2.2, 13.2.2, 14.1.1.4

Owner, Information and Services Required of the
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2,
9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,
14.1.1.4, 14.1.4, 15.1.4

Owner's Authority
1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2,
4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1,
7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2,
10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4,
15.2.7

Owner's Insurance
11.2

Owner's Relationship with Subcontractors
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work
2.5, 14.2.2

Owner's Right to Clean Up
6.3

**Owner's Right to Perform Construction and to
Award Separate Contracts**

6.1
Owner's Right to Stop the Work
2.4

Owner's Right to Suspend the Work
14.3

Owner's Right to Terminate the Contract
14.2, 14.4

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

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12,
5.3

Partial Occupancy or Use
9.6.6, **9.9**

Patching, Cutting and
3.14, 6.2.5

Patents
3.17

Payment, Applications for
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1,
14.2.3, 14.2.4, 14.4.3

Payment, Certificates for
4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1,
9.10.3, 14.1.1.3, 14.2.4

Payment, Failure of
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final
4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

Payment Bond, Performance Bond and
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Payments, Progress
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

PAYMENTS AND COMPLETION 9

Payments to Subcontractors
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB
10.3.1

Performance Bond and Payment Bond
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Permits, Fees, Notices and Compliance with Laws
2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF 10

Polychlorinated Biphenyl
10.3.1

Product Data, Definition of
3.12.2

Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7

Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4

Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

Project, Definition of
1.1.4

Project Representatives
4.2.10

Property Insurance
10.2.5, **11.2**

Proposal Requirements
1.1.1

PROTECTION OF PERSONS AND PROPERTY 10

Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Rejection of Work
4.2.6, 12.2.1

Releases and Waivers of Liens
9.3.1, 9.10.2

Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1

Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1

Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10

Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

**Review of Contract Documents and Field
Conditions by Contractor**
3.2, 3.12.7, 6.1.3

Review of Contractor's Submittals by Owner and
Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples
by Contractor
3.12

Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,
12.2.4, 13.3, 14, 15.4

Royalties, Patents and Copyrights
3.17

Rules and Notices for Arbitration
15.4.1

Safety of Persons and Property
10.2, 10.4

Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4

Samples, Definition of
3.12.3

Samples, Shop Drawings, Product Data and
3.11, 3.12, 4.2.7

Samples at the Site, Documents and
3.11

Schedule of Values
9.2, 9.3.1

Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

Separate Contractors, Definition of
6.1.1

Shop Drawings, Definition of
3.12.1

Shop Drawings, Product Data and Samples
3.11, 3.12, 4.2.7

Site, Use of
3.13, 6.1.1, 6.2.1

Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4

Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Special Inspections and Testing
4.2.6, 12.2.1, 13.4

Specifications, Definition of
1.1.6

Specifications
1.1.1, 1.1.6, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14

Statute of Limitations
15.1.2, 15.4.1.1

Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1

Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4

Subcontractor, Definition of
5.1.1

SUBCONTRACTORS
5

Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2,
9.6.7

Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1

Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8,
9.9.1, 9.10.2, 9.10.3

Submittal Schedule
3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of
6.1.1, 11.3

Substances, Hazardous
10.3

Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2,
15.1.2

Substantial Completion, Definition of
9.8.1

Substitution of Subcontractors
5.2.3, 5.2.4

Substitution of Architect
2.3.3

Substitutions of Materials
3.4.2, 3.5, 7.3.8

Sub-subcontractor, Definition of
5.1.2

Subsurface Conditions
3.7.4

Successors and Assigns
13.2

Superintendent
3.9, 10.2.6

Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,
9.10.5, 14.2.1

Surety
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,
15.2.7
Surety, Consent of
9.8.5, 9.10.2, 9.10.3
Surveys
1.1.7, 2.3.4
Suspension by the Owner for Convenience
14.3
Suspension of the Work
3.7.5, 5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14
Taxes
3.6, 3.8.2.1, 7.3.4.4
Termination by the Contractor
14.1, 15.1.7
Termination by the Owner for Cause
5.4.1.1, **14.2, 15.1.7**
Termination by the Owner for Convenience
14.4
Termination of the Architect
2.3.3
Termination of the Contractor Employment
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14
Tests and Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,
9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**
TIME
8
Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3, 9.5.1, 9.7,**
10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5
Time Limits
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,
5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1,
9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2,
15.1.3, 15.4
Time Limits on Claims
3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work
9.3.2, 9.3.3
UNCOVERING AND CORRECTION OF WORK
12
Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3
Unit Prices
7.3.3.2, 9.1.2
Use of Documents
1.1.1, 1.5, 2.3.6, 3.12.6, 5.3
Use of Site
3.13, 6.1.1, 6.2.1
Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.3.2
Waiver of Claims by the Contractor
9.10.5, 13.3.2, **15.1.7**
Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**
Waiver of Consequential Damages
14.2.4, 15.1.7
Waiver of Liens
9.3, 9.10.2, 9.10.4
Waivers of Subrogation
6.1.1, **11.3**
Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,
15.1.2
Weather Delays
8.3, 15.1.6.2
Work, Definition of
1.1.3
Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,
13.2, 13.3.2, 15.4.4.2
Written Interpretations
4.2.11, 4.2.12
Written Orders
1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

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 protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

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

and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 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.

SECTION 00 7300
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 7200 - General Conditions and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.
- C. Related Documents: Section 00 7300A Supplementary General Conditions

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SUPPLEMENTARY GENERAL CONDITIONS TO AIA DOCUMENT A201-2017
GENERAL CONDITIONS FOR THE CONTRACT OF CONSTRUCTION,
DATED XXXXXX, 2022 BY AND BETWEEN
("OWNER")
AND
("CONTRACTOR")**

GENERAL CONDITIONS

The General Conditions of the Contract for Construction, AIA Document A201-2017, Articles 1 through 15 inclusive, 23 pages, is hereby designated as one of the Contract Documents, and shall govern the Work under this Contract.

SUPPLEMENTARY GENERAL CONDITIONS

The Supplementary General Conditions set forth herein are likewise designated one of the Contract Documents, and amend and supplement, and in some cases, void portions of the General Conditions (AIA A201-2017) as set forth below and except as hereby amended and supplemented (or voided) the AIA General Conditions shall remain in full force and effect. The article numbers set forth in the Supplementary General Conditions correspond to (or are in addition to) the article numbers set forth in the AIA General Conditions (AIA Document A201-2017).

ARTICLE 1 - GENERAL PROVISIONS

1. Article 1, Subparagraph 1.1.2: In paragraph 1.1.2 in the first line, before the word "represents" add the following: "(or the "Agreement"); and in the seventh line, after the word "Architect", add ", as a representative of the Owner,".
2. Article 1, Subparagraph 1.2.1: Delete the second sentence of subparagraph 1.2.1 beginning "The Contract Documents are complementary..." in its entirety from this Agreement. Add the following new subparagraph 1.2.1.2 at the end of subparagraph 1.2.1.1:

1.2.1.2 In the event of conflicts or discrepancies amongst the Contract Documents, interpretations will be based on the following priorities:

- .1 the Agreement.
- .2 Addenda, with those of later date having precedence over those of an earlier date.
- .3 the Supplementary Conditions.
- .4 the General Conditions of the Contract for Construction.
- .5 Drawings and Specifications.

In the case of an inconsistency between or among the Contract Documents, the more specific provision will take precedence over the less specific; the more stringent will take precedence over the less stringent; the more expensive item will take precedence over the less expensive, in accordance with the Architect's interpretation. Scaling Drawings for dimensions, if done, is done at the Contractor's own risk.

3. Article 1, add subparagraph 1.6.3:

1.6.3 "ALL NOTICE REQUIREMENTS WILL BE STRICTLY CONSTRUED."

ARTICLE 2 - OWNER

4. Article 2, Subparagraph 2.1.1.1: Add the following new subparagraph 2.1.1.1 immediately after subparagraph 2.1.1 of this Agreement:

2.1.1.1 Wherever the word "Owner" or a pronoun in place of it occurs in the Contract Documents it refers to the:

Board of Education
Warwick Valley Central School District
225 West Street Ext
Warwick, New York 10990

5. Article 2, Subparagraph 2.2.1: Delete this Subparagraph 2.2.1 in its entirety from this Agreement.
6. Article 2, Subparagraph 2.2.4: In the third line of this Subparagraph 2.2.4, add the word "reasonable", before the word "accuracy."
7. Article 2, Subparagraph 2.2.4: In line two of this Subparagraph 2.2.4, delete the word "shall" and replace it with the word "may."
8. Article 2, Subparagraph 2.3.65: Delete subparagraph 2.3.6 in its entirety from this Agreement and use the following new subparagraph 2.3.6 in lieu thereof:

2.3.6 The Contractor will be furnished, free of charge, 10 copies of Drawings and Project Manuals. Owner shall furnish additional sets upon Contractor's written request at the cost of reproduction, postage and handling. Subcontractors and other entities desiring copies of Drawings and Project Manuals shall obtain them from the Contractor.

9. Article 2, Subparagraphs 2.3.2.1 and 2.3.2.2: Add the following new subparagraphs 2.3.2.1 and 2.3.2.2 immediately after subparagraph 4.1.1 of this Agreement:

2.3.2.1 Wherever the word Architect or Architects or a pronoun in place of either occurs in the Contract Documents it refers to:

Eisenbach and Ruhnke Engineering, P.C.
291 Genesee Street
Utica, NY 13501

2.3.2.2 The firms listed on the title sheet of the Project Manual are Consultants employed by the Architect, and are agents of the Architect and will make observation of their respective branches of the Project. All changes in the Work must be processed through the Architect.

ARTICLE 3 - CONTRACTOR

10. Article 1, Subparagraph 3.2.1: Delete subparagraph 3.2.1 in its entirety from this Agreement and use the following new subparagraph in lieu thereof:

3.2.1 By executing the Contract, Contractor represents and warrants to the Owner that:

.1 Contractor is and will be financially responsible and has and will have sufficient liquidity to meet its financial responsibilities under the Contract and for all other Projects in which Contractor is or may become involved;

- .2 Contractor has carefully examined the Contract Documents and has visited and examined the site;
- .3 from Contractor's investigation, Contractor has satisfied itself as to the nature and location of the proposed Work, general and local conditions, and all matters which may in any way affect the Work or its performance; and
- .4 Contractor fully understands the intent and purpose of the Contract Documents.
- .5 The Contractor acknowledges that the Owner is a school district which is subject to various laws and regulations of the State of New York. The Contractor will, in each phase of the Contract, in accordance with applicable standards, comply with applicable laws and regulations as they pertain to the bidding and construction of the Project, including, without limitation, the requirements of Article 5-A of the General Municipal Law; Article 9 of the Education Law; and Sub-Chapter J, Part 155 of Title 8, Chapter II of the Codes, Rules and Regulations of the State of New York.

Claims for additional compensation and/or extension of time relating to Contractor's non-compliance with its representations and warranties in the preceding sentence will not be allowed.

11. Article 3, Subparagraph 3.2.3: Add the following sentence at the end of this Subparagraph 3.2.3:

The Contractor shall be liable to the Owner for any damage resulting from any such errors, inconsistencies or omissions in the Contract Documents not reported to the Architect.

12. Article 3, Subparagraph 3.4.2: Add the following language at the end of this Subparagraph 3.4.2:

", assessing the Architect's charges for evaluation against the Contractor."

13. Article 3, Subparagraphs 3.4.4 and 3.4.5: Add the following new subparagraphs 3.4.4 and 3.4.5 immediately after subparagraph 3.4.3 of this Agreement:

3.4.4 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications) and as set forth below.

3.4.4.1 The Architect will be allowed a reasonable time within which to evaluate each proposed substitution. The Architect will be the sole judge of equivalence, and no substitution shall be ordered, installed or utilized without the Architect's prior written acceptance. Owner may require Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitution. The Architect will record time required by the Architect and the Architect's Consultants in evaluating substitutions proposed by Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not the Architect accepts a proposed substitution, Contractor shall reimburse Owner for the charges of the Architect and the Architect's Consultants for evaluating each proposed substitution.

3.4.5 By making requests for substitutions based on subparagraph 3.4.4 above, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
- .4 will coordinate the installation of the accepted substitution making such changes as may be required for the Work to be complete in all respects.

14. Article 3, Subparagraph 3.5: Add the following language at the end of paragraph 3.5 of this Agreement:

Neither final payment, nor provision in Contract Documents, nor partial or entire occupancy of premises by Owner shall constitute an acceptance of Work not done in accordance with Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

15. Article 3.6 Taxes : Substitute the following provisions in lieu of Article 3.6:

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

3.6.2 The Owner represents that it is an organization operated for purposes which makes it exempt from New York Sales and Compensating Use Tax pursuant to Section 1115(a)(15) of the Tax Law, as amended by laws of New York 1974, Ch. 513 and 514. The Contractor is advised that the Owner is exempt from payment of all State and Local sales and compensating use taxes of the State of New York and cities and counties on the purchase of all materials and supplies incorporated in and becoming an integral component part of the structures, buildings or real property, pursuant to the provisions of this Contract. Such taxes are not to be included in the Contract Sum, Bid or costs to be reimbursed, as the case may be. This exemption does not, however, apply to tools, machinery, equipment or other property leased by or to the Contractor or a Subcontractor or to supplies and materials which, even though they are consumed in the performance of the Contract, are not incorporated into the completed permanent work, and the Contractor and its Subcontractors shall be responsible for and pay all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such unincorporated supplies and materials. Owner shall deliver to Contractor the appropriate exemption certificate required to be supplied by the Owner, and Contractor and its Subcontractors and material suppliers shall be solely responsible for obtaining or delivering any and all exemption or other certificates and for furnishing a Contractor Exempt Purchase Certificate or other appropriate certificates to all persons, firms or corporations from whom they purchase supplies, materials and equipment for the performance of the work covered by this Contract.

3.6.3 Except as otherwise specified, all Federal, State and Local taxes are included in the Contract Sum.

3.6.4 Contractor shall pay all costs and liabilities for the amounts assessed, or which may be assessed by the Federal, State and local governments under any and all Acts or Laws upon the wages and salaries paid or to be paid all employees of the Contractor and its Subcontractors under this Contract.

16. Article 3, Subparagraph 3.7.1: Delete subparagraph 3.7.1 in its entirety from this Agreement and use the following new subparagraph 3.7.1 in lieu thereof:
- 3.7.1 The Owner shall provide the building permit. The Contractor shall secure and pay for all required permits, governmental fees, licenses, certificates of inspection, of occupancy, of Underwriters, and all other required certificates for the Work, necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received. The Contractor shall promptly deliver copies of such documents to the Owner.
17. Article 3, Subparagraph 3.7.3: In the first line of subparagraph 3.7.3, replace the word “knowing” with the following language: “and knows or should know...”. In the last line after the word "correction", add the following language: “, including applicable fines, or penalties”.
18. Article 3, Subparagraph 3.7.6: Add the following new subparagraph 3.7.6 immediately after subparagraph 3.7.5 of this Agreement:
- 3.7.6 The Contractor shall be responsible for securing and paying for permits for itself and its employees, as required by applicable law. Contractor represents that all such required licenses, fees or permits are or will be secured by the date of execution of the Contract, where possible, and in no case later than commencement of the Work. Failure to possess any such license constitutes a material breach of this Contract.
19. Article 3, Subparagraph 3.8.2.2: Add the following language at the end of subparagraph 3.8.2.2 of this Agreement: "except when installation is specified as part of the allowance in the General Requirements (Division 1 of the Specifications)".
20. Article 3, Subparagraph 3.10.3: In the second line after the word "Architect", insert the following language: "and approved by the Owner".
21. Article 3, Subparagraph 3.10.4 and 3.10.5: Add the following new subparagraphs 3.10.4 and 3.10.5 immediately after subparagraph 3.10.3 of this Agreement:

3.10.4 PROJECT SCHEDULING

- .1 After the Contractor has received from the Owner a notice to proceed or a letter of intent, a preconstruction conference will be held. The procedures and scheduling of the Work will be discussed.
- .2 At the preconstruction conference, the General Contractor shall submit an estimated preliminary (bar chart or critical path method) progress schedule of its own Work indicating starting dates and estimated completion dates of each of the items of Work or material to be installed, and completion date(s) of its Work, using the time of completion set forth in the Contract Documents. Fifteen copies of this preliminary schedule shall be submitted.
- .3 Within 14 days of receipt of this preliminary schedule and using this preliminary schedule prepared by the General Contractor as a guide, each other Prime Contractor shall prepare a preliminary progress schedule of its own Work indicating the starting dates and time of completion of each of the items of Work or material to be installed, and completion date(s) of its Work, dovetailing such dates with the indicated dates in the General Contractor’s preliminary schedule and send 15 copies to the Architect.
- .4 When the schedules from each Contractor have been received by the Architect, the Architect will call a meeting of all Contractors. The schedule

shall be discussed by all Contractors and adjusted by them as may be deemed necessary to perform the Work of the Project. Based on these discussions, each Contractor shall submit 5 copies of its revised progress schedule to the Architect. After review and acceptance of the progress schedules by the Architect and Owner, the General Contractor shall perform the ministerial task of preparing a composite progress schedule. Fifteen copies of the composite progress schedule shall be provided to the Architect for distribution.

- .5 Once the composite progress schedule has been agreed upon by all of the Contractors, the Architect and the Owner, it shall be signed by all Contractors and shall be strictly enforced until the Project is completed, unless it becomes necessary to revise it by an appropriate modification.
- .6 No payments will be made on any of the Contracts until the scheduling procedures in this subparagraph 3.10.4 have been completed.

3.10.5 PROCEDURES AND SCHEDULE OF WORK

- .1 Unless otherwise stated, the Work shall be progressed continuously, without interruption, so that all Work can be completed in the time set forth in the Contract Documents.
- .2 The Contractor shall cooperate with the Owner so as to interfere as little as possible with the operations of the Owner. The Owner's approval shall be obtained prior to the starting of operations which may interfere with the operations of the Owner.

22. Article 3, Subparagraph 3.12.10: Delete this Subparagraph 3.12.10 in its entirety.

23. Article 3, Subparagraph 3.15.1: In the first line after the word "Contractor", insert the following language: ", at all times,"; and in the second line after the word "remove", insert the word "all".

24. Article 3, Subparagraph 3.18.1: Delete subparagraph 3.18.1 in its entirety from this Agreement and use the following new subparagraphs 3.18.1.1 and 3.18.1.2 in lieu thereof:

3.18.1.1 To the maximum extent permitted by law, the Contractor hereby assumes the entire responsibility and liability for any and all damage (direct or consequential) and injury (including death), disease or sickness of any kind or nature whatsoever, to all persons, whether or not employees of the Contractor, and to all property and business or businesses, caused by, resulting from, arising out of, or occurring in connection with:

- .1 the Work;
- .2 the performance or intended performance of the Work;
- .3 the performance or failure to perform the Contract; or
- .4 any occurrence which happens in or about the area where the Work is being performed by the Contractor, either directly or through a Subcontractor, or while any of Contractor's property, equipment or personnel is in or about such area.

3.18.1.2 Except to the extent, if any, expressly prohibited by law, should any such damage or injury referred to in subparagraph 3.18.1.1 be sustained, suffered, or incurred by Owner or Architect, or should any claim for such damage or injury be made or asserted against any of them, whether or not such claim is based upon Owner's or Architect's

alleged active or passive negligence or participation in the wrong or upon any alleged breach of any statutory duty or obligation on the part of the Owner or Architect, Contractor shall indemnify and hold harmless Owner and Architect, their Board of Education, Administration officers, agents, partners, and employees (hereinafter collectively referred to as "Indemnitees"), of, from and against any and all other loss, cost, expense, and liability, including without limitation, legal fees and disbursements, that Indemnitees may directly or indirectly sustain, suffer or incur as a result of such damages, injuries and claims; and Contractor agrees to assume, on behalf of any and all Indemnitees the defense (with counsel satisfactory to the party indemnified) of any action at law or in equity, or other legal proceeding, which may be brought against any Indemnitee upon or by reason of such damage, injury or claim and to pay on behalf of every Indemnitee, the amount of any judgment, decree, award, or order that may be entered against each said Indemnitee in any such action or proceeding. In the event that any such claim, loss, cost, expense, liability, damage or injury is sustained, suffered, or incurred by, or is made, asserted or threatened against any Indemnitee, Owner shall, in addition to all other rights and remedies, have the right to withhold from any payments due and to become due to Contractor an amount sufficient in Owner's judgment to protect and indemnify the Indemnitee(s) from and against any and all such claim, loss, cost, expense, liability, damage or injury, including legal fees and disbursements; or Owner, in its discretion, may require Contractor to furnish a surety bond satisfactory to Owner guaranteeing such protection which bond shall be furnished by Contractor within 5 days after written demand has been made therefore. In the event more than one Contractor is connected with an event or occurrence (or series of events or occurrences) covered by this indemnification, then all such Contractors shall be jointly and severally responsible to the Indemnitee, and the ultimate responsibility among such indemnifying Contractors shall be settled or otherwise determined by separate proceedings and without loss, expense or damage to any Indemnitee.

25. Article 3, Subparagraphs 3.18.3, 3.18.4, 3.18.5 and 3.18.6: Add the following new subparagraphs 3.18.3, 3.18.4, 3.18.5 and 3.18.6 immediately after subparagraph 3.18.2 of this Agreement:

3.18.3 In any and all claims against the Owner or the Architect or their agents or employees by third parties, the indemnification obligation under this paragraph 3.18 shall apply and shall not be limited by limitation or amount of or type of damages, compensation, or benefits payable by or for the Contractor or Subcontractors.

3.18.4 Contractor shall comply with, and cooperate with, Architect and Owner in complying with legal requirements. Among other things, Contractor shall be responsible for performing corrective work within abatement periods, appealing from decisions or orders, requesting extensions on abatement periods, and furnishing such information or evidentiary material as may be necessary or as may be requested by Architect or Owner to fully protect the rights and interests of Owner and Architect with respect to possible, threatened or pending proceedings or orders.

3.18.5 Without limitation, Contractor shall indemnify Owner and/or Architect pursuant to paragraph 3.18 hereof in respect of subparagraph 3.18.4 and the responsibilities of Contractor specified in Article 13 and subparagraphs 3.6.2, 3.19.3, 3.19.5 and 3.19.10 and elsewhere in the Contract Documents pertaining to legal requirements.

3.18.6 Natale Patent Rights. For any Contractor performing asbestos abatement as part of its Scope of Work:

- .1 Contractor shall hold a valid current license to perform work using the negative pressure system covered by the Natale Patent or provide an Indemnity Agreement as follows:
- .2 Indemnity Agreement: Contractor and Contractor's surety agree to protect, indemnify and hold harmless the Owner and the Architect, and the Board

of Education, Administration directors, officers, agents, employees, and assigns of the Architect from any and all claims, judgments, liabilities, expenses, attorney fees, court costs, or losses of any nature, resulting from claims of patent right infringement including but not limited to U.S. Patent Number 4,604,111, commonly known as the Natale Patent, arising out of the performance of Work on the Project.

- (a) The provisions of this Indemnity Agreement shall protect the Indemnitees against all claims arising out of the subject matter or performance of this Contract and Contract Documents, including, without limitation, allegations or findings that the Indemnitees, or any of them, were guilty of negligence in the issuance of such Contract.
- (b) The provisions of this Indemnity Agreement shall be in addition to and shall in no way delete any provisions, including warranty and indemnity provisions of the Agreement.

26. Article 3, Paragraph 3.19: Add the following new paragraph 3.19 immediately after paragraph 3.18 of this Agreement:

3.19 CONTRACTOR'S RESPONSIBILITIES

Contractor agrees, in addition to all other responsibilities and duties under the Contract:

3.19.1 To use all necessary means to discover and to notify Architect in writing of any defect in other Work upon which the satisfactory performance of the Work may depend, and to allow a reasonable amount of time for remedying such defects. If Contractor should proceed with the Work, Contractor shall be considered to have accepted and be responsible for such other Work unless over Contractor's written objection, Contractor shall have proceeded pursuant to written instructions from Architect.

3.19.2 To submit to Owner and Architect promptly upon request, information with respect to the names, responsibilities and titles of the principal members of Contractor's staff.

3.19.3 To take all steps necessary to avoid labor disputes; and to be responsible for any delays and damages to Owner caused by such disputes.

3.19.4 To pay for costs of repair to other Work attributable, in whole or in part, to the fault or negligence of Contractor and Owner's charges for removal of rubbish attributed by Owner or Architect to Contractor, and any cleanup related to Contractor or the Work.

3.19.5 To comply with all legal requirements; to appear at hearings, proceedings or in court in respect of such compliance or in respect of violations or claimed violations of legal requirements; to pay any fines or penalties imposed for said violations; and to pay all legal fees, fines and penalties incurred by or imposed upon Owner relating to Contractor's compliance, violations or claimed violations. Without limiting the foregoing, Contractor shall appear at hearings, proceedings and/or in court and consent to its substitution as a party defendant in respect of all summonses and claimed violations arising out of or relating to the Work.

3.19.6 Not to display on or about the Project site any sign, trademark or other advertisement, without written consent of the Owner.

3.19.7 That before any subcontractor or supplier is employed by Contractor, the name of such Subcontractor or supplier shall be submitted in writing to the Owner through the Architect, and no Subcontractor or supplier shall be employed unless acceptable to the

Owner. Each Subcontractor and supplier shall be bound by all Contract Documents to the same extent and with the same effect as if the Subcontractor or supplier were the Contractor. Contractor shall cause Subcontractors and suppliers to comply with all the Contract Documents. Contractor shall be responsible for all the acts, work, material and equipment of its Subcontractors and supplier and all persons either directly or indirectly employed by any of them.

3.19.8 That in the event of any dispute as to whether any item or portion of the Project is within the scope of the Work to be performed by Contractor or any dispute as to whether Contractor is entitled to an extra payment, Contractor shall continue to proceed diligently with the performance of the Work, the Contract, and the disputed Work. The resolution, by agreement or otherwise, of the disputed Work, shall be made between Contractor and Owner with reasonable promptness. In no event shall delay in such resolution excuse prompt performance by Contractor of the Work, the Contract and the disputed Work.

3.19.9 To:

- .1 furnish a competent and adequate staff and use its best skill and attention for the proper administration, coordination, supervision and superintendence of the Work;
- .2 organize the procurement of all materials and equipment so that they will be available at the time needed for the Work;
- .3 keep an adequate force of skilled workers on the job to complete the Work in strict accordance with all requirements of the Contract Documents;
- .4 maintain throughout the duration of the Work a competent superintendent and any necessary assistants, all of whom shall be acceptable to Owner and shall not be changed without the consent of the Owner;
- .5 enforce discipline and order among Contractor's employees and not to employ at the Project any unfit person or anyone not skilled in the task assigned; and
- .6 provide supervision by experts in all aspects of the application of the materials, equipment or system being fabricated and installed.

3.19.10 That if any Work is performed which is contrary to legal requirements, to promptly make all changes as required and take all other corrective action to comply therewith and pay all costs arising therefrom.

3.19.11 That any review or consideration by Owner or Architect of any method of construction, invention, appliance, process, article, device or material of any kind shall be for its general adequacy for the Work and shall not be an approval for the use thereof by Contractor in violation of any patent or other rights of any third person. Owner and Architect shall in no event be deemed to have reviewed or to have been required to review or consider the means and methods of construction, all of which are chosen exclusively by the Contractor.

3.19.12 That if any provision of the Contract Documents conflicts with any agreement among members of trade associations, or with a union or labor council which regulates the work to be performed by a particular trade, to reconcile such conflict without delay or damage to Owner. In the event the progress of the Work is delayed by such conflict, Architect may require that other material or equipment of equal or better kind and quality be provided at no additional cost to Owner. This right of substitution shall not limit other rights which Owner may have concerning such delay.

3.19.13 In accordance with the Health Law and the Education Law, the Contractor, including any of its employees, subcontractors, suppliers or materialmen or other representatives, shall not use tobacco in any form on school property during the course of the Work. Contractors failing to abide by this requirement shall be prohibited from working at the site and shall be responsible for any consequent delays or added costs to the Owner as a result of such noncompliance.

3.19.14 The Contractor shall provide reasonable and visible identification for each employee, subcontractor, or other person at the Project site, and shall, upon request of the Owner, make available a list of names of those employees, subcontractors or others working under the direction of the Contractor at the Project site. Any such identification shall be reasonably visible to the Architect and to school personnel at all times to allow the Owner to maintain the safety and security of school buildings, school property and persons at the Project site. Contractors failing to abide by this requirement shall be prohibited from working at the site and shall be responsible for any consequent delays or added costs to the Owner as a result of such noncompliance.

27. Article 3, Subparagraph 3.19.15: Add the following new subparagraph 3.19.15 immediately after subparagraph 3.19.14 of this Agreement:

3.19.15.1 Initial Dispute Resolution. If a dispute arises out of or related to this Agreement or its breach, the parties shall endeavor to settle the dispute first through direct discussions. If the dispute cannot be settled through direct discussions, the parties shall endeavor to settle the dispute by mediation under the Construction Industry Mediation Rules of the American Arbitration Association or other dispute resolution service acceptable to the parties. The location of the mediation shall be the location of the Project. Once a party files a request for mediation with the other party and with the American Arbitration Association or other service, the parties agree to conclude such mediation within thirty (30) days of filing of the request. Costs shall be borne equally by the parties. Agreements between Owner and Contractor and Owner shall include this dispute resolution clause and each party to such agreement shall have the same duties under those separate agreements which the Owner and Architect have under this Agreement and shall be available for multiparty mediation pursuant to this paragraph.

3.19.15.2 Work Continuance and Payment. Unless otherwise agreed in writing, the Owner and Contractor shall continue to perform under this Agreement during any non-judicial dispute resolution proceedings. If the Contractor continues to perform, the Owner shall continue to make payments in accordance with this Agreement.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

28. Article 4, Subparagraph 4.1.2: In the second line, following Owner, delete the word ", Contractor"

Article 4, Subparagraph 4.1.2: In the first line, after the word "Architect" delete "as set forth in the Contract Documents"

29. Article 4, Subparagraph 4.2.2: Add the following language at the end of this Subparagraph 4.2.2:

On the basis of onsite observations and otherwise, the Architect shall keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.

30. Article 4, Subparagraph 4.2.2.1: Add the following new subparagraph 4.2.2.1 immediately after subparagraph 4.2.2 of this Agreement:

4.2.2.1 The Architect will promptly report to the Owner any defects or deficiencies of the Work of the Contract which he may observe.

31. Article 4, Subparagraph 4.2.5: After the word "Architect's" in the first line, add the words "observations and".
32. Article 4, Subparagraph 4.2.6: In line one, following the word "authority", add the words "and responsibility".
33. Article 4, Subparagraph 4.2.7: In the third line of subparagraph 4.2.7, delete the phrase "information given and" in its entirety from this Agreement.
34. Article 4, Subparagraph 4.2.11: In the first line of subparagraph 4.2.11, delete the words "interpret and decide matters" and replace them with the words "provide recommendations".
35. Article 4, Subparagraph 4.2.12: In the third line of this subparagraph 4.2.12, delete the word " decisions"
36. Article 4, Subparagraph 4.2.12.1: Add the following new subparagraph 4.2.12.1 immediately after subparagraph 4.2.12 of this Agreement:

4.1.12.1 If Work is described or indicated in a manner which makes it impossible to carry out the requirements of the Contract Documents, or should discrepancies appear among the Contract Documents, the Contractor shall request interpretation before proceeding with the Work. If Contractor fails to make such a request, no excuse will be entertained for failure to carry out the Work of the Contract Documents. Should a conflict occur in or between Contract Documents, the Contractor is deemed to have estimated on the more expensive way of doing the Work.

37. Article 4, Paragraph 4.3: Add the following new paragraph 4.3 to Article 4 of this Agreement:

4.3 OWNER'S SITE REPRESENTATIVE

4.3.1 The Owner may engage an Owner's Site Representative. The duties, responsibilities and limitations of the Owner's Site Representative shall be as follows:

4.3.2 Unless otherwise provided, the Owner's Site Representative shall:

- .1 Observe the progress and quality of the Work as is reasonably necessary at that stage of construction to determine in general that it is proceeding in accordance with the Contract Documents and notify the Architect immediately if, in the Owner's Site Representative's opinion, Work does not conform to the Contract Documents or requires special inspection or testing.
- .2 Monitor the construction schedule and report to the Owner and Architect conditions which may cause delay in completion.
- .3 Review Contract Documents with the Contractor's superintendent and obtain necessary interpretations from the Architect.
- .4 Consider the Contractor's suggestions and recommendations, evaluate them and submit recommendations to the Architect for decision.
- .5 Attend preconstruction and progress meetings.
- .6 Observe tests required by the Contract Documents and report to Architect. Verify testing invoices to be paid by the Owner, if any.

- .7 Maintain records at the site in an orderly manner. Include correspondence, Contract Documents, Change Orders, Construction Change Directives, Architect's Supplemental Instructions, meeting and field reports, Shop Drawings, Product Data, Samples, detail drawings, color schedules, Applications for Payment, and names, addresses and telephone numbers of Contractors, Subcontractors and principal material suppliers.
- .8 Keep a log recording the Owner's Site Representative's time and activities relating to the Project, weather conditions, nature and location of the Work being performed, verbal instructions and interpretations given to the Contractor, substantial deliveries of materials, number of workers on site by Contract and specific observations. Record any occurrence or Work that might result in a claim for a change in Contract Sum or Contract Time. Maintain a list of visitors, their titles, and the time and purpose of their visit.
- .9 Notify the Architect if any portion of the Work requiring Shop Drawings, Product Data or Samples is commenced before such submittals have been processed by the Architect. Maintain custody of Samples.
- .10 Observe the Contractor's Record Drawings at intervals appropriate to the stage of construction and notify the Architect of any apparent failure of the Contractor to maintain current records.
- .11 Review Applications for Payment submitted by the Contractor, initial and return them to the Contractor with findings for disposition. In any instance when a recommendation for substantially less than full payment requested is made, also notify the Owner of such recommendation.
- .12 Review, and if acceptable, sign Contractor's daily records of time spent and materials utilized associated with "time and materials" Change Orders and Construction Change Directives.
- .13 Review the list of items to be completed or corrected which is submitted by the Contractor with a request for issuance of a Certificate of Substantial Completion. Inspect the Work and if the list is accurate, forward it to the Architect for disposition; if not, so advise the Architect and return the list to the Contractor for correction.
- .14 Order the Contractor to stop the Work or any portion thereof under the conditions of paragraph 2.3.

4.3.3 Unless otherwise provided, the Owner's Site Representative shall not:

- .1 Authorize deviations from the Contract Documents.
- .2 Accept substitute materials or equipment.
- .3 Assume any of the responsibilities of the Contractor's Superintendent or of Subcontractors.
- .4 Communicate with Subcontractors.
- .5 Advise on, or issue directions concerning, aspects of construction means, methods, techniques, sequences or procedures, or safety precautions and programs in connection with the Work.

ARTICLE 5 - SUBCONTRACTORS

38. Article 5, Subparagraph 5.1.1: In the second line, delete the phrase "at the site" in its entirety from this Agreement.
39. Article 5, Subparagraph 5.1.2: In the second line, delete the phrase "at the site" in its entirety from this Agreement.
40. Article 5, Subparagraph 5.2.1.1: Add the following new subparagraph 5.2.1.1 immediately after subparagraph 5.2.1 of this Agreement:

5.2.1.1 Not later than 72 hours after the Contractor's receipt of Contract award notification, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities proposed as manufacturers and proprietary product names.

41. Article 5, Subparagraph 5.2.3: Commencing in the third line, delete the second and third sentences of subparagraph 5.2.3 in their entirety from this Agreement.
42. Article 5, Subparagraph 5.2.5: Add the following new subparagraph 5.2.5 immediately after subparagraph 5.2.4 of this Agreement:

5.2.5 The Contractor shall not award work to any one Subcontractor in excess of fifty percent (50%) of the Contract Sum, without prior written approval of the Owner.

ARTICLE 7 - CHANGES IN THE WORK

43. Article 7, Subparagraph 7.1.2: Add the following new subparagraph 7.2.2 immediately after subparagraph 7.2.1 of this Agreement:

7.2.2 All Change Orders must have the approval of the Owner in writing.

44. Article 7, Article 7.3.4: Commencing in the fourth line, replace the words "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" with the following "an allowance for overhead and profit in accordance with subparagraph 7.3.11".
45. Article 7, Article 7.3.11: Add the following new subparagraph 7.3.11 immediately after subparagraph 7.3.10 of this Agreement:

7.3.10 In subparagraph 7.3.4, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:

Change Order Cost (not includ- ing overhead and profit)_____	Profit and Overhead on Contractor's Own Work_	Profit and Overhead on Subcontractor's Work for this Contractor_____	Profit and Overhead on Subcontractor's Own Work___
0- 5,000	18%	9%	13%
5,001- 10,000	17%	9%	12%
10,001- 30,000	16%	8%	12%
30,001- 50,000	15%	8%	11%
50,001- 100,000	14%	8%	11%
Over 100,001	13%	8%	10%

7.3.11.1 Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.6.

7.3.11.2 To facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials, Subcontracts, overhead and profit. Subcontracts shall also be so itemized.

ARTICLE 8 - TIME

46. Article 8, Paragraph 8.2: Delete paragraph 8.2 in its entirety from this Agreement and use the following new subparagraph 8.2 in lieu thereof:

8.2 PROGRESS AND COMPLETION.

8.2.1 TIME IS OF THE ESSENCE IN THE COMMENCEMENT, PROSECUTION AND CONSTRUCTION OF THE WORK. Contractor shall be responsible for all direct and consequential damages to Owner and Architect arising from any delay of Contractor, its Subcontractors and suppliers, in performing or completing the Work in accordance with the time requirements of paragraph 8.2. The indemnity provisions of Articles 3 and 11 are applicable to such damages and to claims arising in respect thereto.

8.2.2 Contractor shall do all things necessary to ensure the prosecution of the Work in accordance with any one or more of the following as determined by Architect, as a representative of the Owner, in its discretion:

- .1 Project schedules and revisions thereof, given from time to time by Contractor;
- .2 the time requirements for various portions of Work;
- .3 the requirements of the Project including, but not limited to, coordination requirements as may from time to time be known to Contractor;
- .4 schedules of the Work provided by Contractor to Architect upon Architect's request.

8.2.3 Should the progress of the Work and/or other Work be delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers so as to cause any additional cost, expense, liability or damage to Owner or Architect or for which Owner or Architect may become liable, Contractor shall hold Owner and Architect harmless from and indemnify Owner and Architect against all such additional cost, expense liability or damage in accordance with the provisions of Article 11.

8.2.4 The Work shall be performed during designated working hours, except that in the event of emergency or when necessary to perform the Work in accordance with the requirements of paragraph 8.2, Work shall be performed at Contractor's cost and expense on other shifts, overtime, Saturdays, Sundays, Holidays and at other times, if permission to do so has been obtained in writing from Owner. Without limiting the requirements of the preceding sentence, if the progress of the Work or of the Project has been delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers, Contractor shall work such overtime, at Contractor's cost and expense as aforesaid, as Architect shall deem necessary or desirable to make up for all time lost and to avoid delay in the completion of the Work and of the Project. The failure by Architect to direct Contractor to engage in such overtime shall not relieve Contractor of the consequences of its delay.

8.2.5 Unless otherwise noted, the date of commencement of the Work is the date established in a notice to proceed. The notice to proceed will be issued immediately upon return of signed documents by the Contractor and the presentation of acceptable insurance certificates. Contractor shall organize construction schedules as specified in paragraph

3.10, Contractor's Construction Schedules. The commencement date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

8.2.6 Architect may direct acceleration of the Work so that it may be performed in advance of the schedules, time requirements and Project requirements described in paragraph 8.2. If so directed, Contractor shall increase its staff and/or work overtime. Contractor will not be entitled to additional compensation for work performed outside of designated working hours, except as approved by Owner and authorized in writing by Architect. Provided that Contractor is not in default under the Contract, and Architect has issued the aforesaid authorization, there shall be added to the Contract Sum as actual out-of-pocket amount equal to:

- .1 additional wages actually paid, at rates which have been accepted by Architect;
- .2 taxes imposed by law on such additional wages;
- .3 premiums for worker's compensation and liability insurance if required to be paid on such additional wages.

Written authorization for overtime which exceeds \$500.00 for which Contractor intends to charge Owner in any one week shall be invalid unless confirmed in writing by the Owner, it being understood that Owner's Site Representative shall not have authority to authorize such overtime which exceeds \$500.00 in any one week.

8.2.7 Contractor and Contractor's surety shall be strictly accountable for completion as a condition to satisfactory contractual performance.

47. Article 8, Paragraph 8.3: Delete paragraph 8.3 in its entirety from this Agreement and use the following new paragraph 8.3 in lieu thereof:

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 If Contractor claims an increase in the Contract Sum or an extension in the completion time required by reason of a change in the Work, Contractor shall give Architect written notice within fourteen (14) days after Contractor's knowledge of the occurrence of the matter giving rise to such claim. This notice shall be given by Contractor before proceeding to execute the changed Work, except in an emergency endangering life or property in which case Contractor shall proceed in accordance with paragraph 10.3. No such claim will be valid unless notice is given as required in this paragraph. Contractor shall proceed to execute the Work, even though the increase or time extension has not been agreed upon.

8.3.2 Should Contractor be obstructed or delayed in the commencement, prosecution or completion of the Work, without fault on its part, by reason of failure to act, direction, order, neglect, delay or default of the Owner or the Architect; by changes in the Work; fire, lightning, earthquake, enemy action, act of God or similar catastrophe; by Government restrictions with respect to materials or labor, or by an industry-wide strike beyond Contractor's reasonable control, then Contractor shall be entitled to an extension of time lost by reason of any and all causes aforesaid, but no claim for extension of time on account of delay shall be allowed unless a claim in writing therefore is presented to Architect with reasonable diligence but in any event not later than fourteen (14) days after the commencement of such claimed delay. Except for the causes specifically listed above in this subparagraph, no other cause or causes of delays shall give rise to an extension of time to perform the Work. The granting of an extension of time is conditioned upon Contractor's timely submission of the aforesaid written notice. Except to the extent, if any,

expressly prohibited by law, Contractor expressly agrees not to make, and hereby waives, any claim for damages, including those resulting from increased labor or material cost, on account of any delay, obstruction or hindrance for any cause whatsoever, whether or not foreseeable and whether or not anticipated including but not limited to the aforescribed causes, and agrees that the sole right and remedy therefore shall be extension of time, provided the requisite condition as to written claim has been met.

8.3.3 Contractor shall not be allowed an extension of time unless Contractor has established to the satisfaction of the Owner and Architect that the delay claimed by Contractor is to a portion of the Work on the critical path of the work schedule.

8.3.4 No monetary recovery may be obtained by Contractor for delay. Time extensions for delay are limited to the specific causes set forth in subparagraph 8.3.2 and, then, only upon compliance with the notice and proof requirements of subparagraph 8.3.1 and 8.3.2.

8.3.5 Under no circumstances will Contractor look to or make a claim against Owner or Architect for the consequences of any delay resulting from directions given or not given by Architect including scheduling and coordination of the Work or resulting from Architect's preparation of Drawings and Specifications or review of Shop Drawings.

ARTICLE 9 - PAYMENTS AND COMPLETION

48. Article 9, Subparagraph 9.3.1.3: Add the following new subparagraph 9.3.1.3 immediately after subparagraph 9.3.1.2 of this Agreement:

9.3.1.3 Until the Contract-scheduled date of Substantial Completion (including authorized adjustment), the Owner shall pay ninety-five (95) percent of the amount due the Contractor on account of progress payments, less an amount necessary to satisfy any claims, liens, or judgments against the Contractor which have not been satisfactorily discharged.

49. Article 9, Subparagraph 9.3.3: Delete the first sentence of subparagraph 9.3.3 in its entirety from this Agreement and use the following sentence in lieu thereof:

The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner either by incorporation in construction or no later than time of payment.

50. Article 9, Subparagraph 9.5.1: In the sixth line of subparagraph 9.5.1, after the words "Architect may", delete the word "also".

51. Article 9, Subparagraph 9.5.1.8: Add the following new clause .8 immediately after subparagraph clause .7 of subparagraph 9.5.1 of this Agreement:

.8 any other breach of this Agreement.

52. Article 9, Subparagraph 9.6.8: Add the following new subparagraph 9.6.8 immediately after subparagraph 9.6.7 of this Agreement:

9.6.8 The Owner shall make no payment to the Contractor after the Contract-scheduled date of Substantial Completion (including authorized adjustments) until the actual date of Substantial Completion.

53. Article 9, Subparagraph 9.7: In the second line of subparagraph 9.7, replace the words "does not" with the words "fails persistently to"; in the fourth line, replace the number "seven" with the number "twenty-one".

54. Article 9, Subparagraph 9.8.5: At the end of subparagraph 9.8.5, add the following language:

The payment shall be sufficient to increase the total payments to 100 percent (100%) of the Contract Sum, less twice the value for incomplete Work and unsettled claims as the Architect shall determine.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

55. Article 10, Subparagraphs 10.1.2, 10.1.3, 10.1.4 and 10.1.5: Redesignate paragraph 10.1 as 10.1.1 and add the following new subparagraphs 10.1.2, 10.1.3, 10.1.4 and 10.1.5 immediately after subparagraph 10.1.1 of this Agreement:

10.1.2 For Asbestos Abatement Contract Work; Environmental Control Contract Work; and Roofing Contract Work, only: Delete references to asbestos in subparagraph 10.3.1.

10.1.3 For, Electrical Contract Work, only: Delete references to polychlorinated biphenyl (PCB) in subparagraph 10.3.1.

10.1.4 If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in subparagraphs 10.3.1 and 10.3.2.

10.1.5 The Owner shall be responsible for obtaining the services of a licensed laboratory to verify a 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 verify that it has been rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and the Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such 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.

56. Article 10, Subparagraphs 10.2.9 and 10.2.10: Add the following new subparagraphs 10.2.9 and 10.2.10 immediately after subparagraph 10.2.8 of this Agreement:

10.2.9 OSHA. In addition to all requirements set forth herein, all Contractors and Subcontractors who perform any work under this Contract shall fully comply with the provisions of the Federal Occupational Safety and Health Act of 1970 and with any rules and regulations pursuant to the Act. This requirement shall apply continuously and not be limited to normal working hours.

10.2.10 Code Rule 56. In addition to all requirements set forth herein, all Contractors and Subcontractors who perform any Work under this Contract shall fully comply with the provisions of 12 NYCRR Part 56.

57. Article 10, Subparagraph 10.4: Delete subparagraph 10.4 in its entirety from this Agreement and use the following new subparagraph 10.4 in lieu thereof:

10.4 In an emergency affecting life, the Work, or the Owner, or Owner's property, Contractor, without special instructions or authorization from Architect, shall take the

action necessary to deal adequately with such emergency. Notice of any such action shall be given by Contractor to Architect and Owner as soon as is practicable.

ARTICLE 11 - INSURANCE AND BONDS

58. Article 11, Subparagraph 11.1.1: In line 3, after Contract Documents, add: "as provided for by AIA Document A101-2017 Exhibit A which is annexed hereto and made a part hereof."
59. Article 11, Subparagraph 11.1.1: Beginning in the fourth line, replace the phrase "lawfully authorized to do business in the jurisdiction in which the Project is located such" with the following language: "rated A or better by the A.M. Best Company and licensed to do business in the state in which the Project is located such occurrence-based". All insurance purchased by Contractor shall constitute primary insurance and primary coverage for all risks insured and that any other liability insurance that Eisenbach and Ruhnke Engineering, P.C. may procure or maintain is secondary and that there shall be no contribution by such insurance until insurance provided by the Contractor is exhausted.
60. Article 11, Subparagraphs 11.1.1: Add the following new subparagraphs.
- 11.1.1.1 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:
- .1 Premises Operations (including X, C and U coverages).
 - .2 Independent Contractor's Protective.
 - .3 Products and Completed Operations.
 - .4 Personal Injury Liability with Employment Exclusion deleted.
 - .5 Contractual, including specified provisions for Contractor's obligation under paragraph 3.18.
 - .6 Owned, non-owned and hired motor vehicles.
 - .7 Broad Form Property Damage including Completed Operations.
- 11.1.1.2 If the General Liability coverages are provided by a Commercial General Liability Policy, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in compliance with subparagraph 9.10.2.
- 11.1.1.3 The insurance required by subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:
- 1. Worker's Compensation:
 - a. State: Statutory
 - b. Applicable Federal: Statutory
 - c. Employer's Liability: Statutory
 - 2. Comprehensive or Commercial General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):
 - a. Bodily Injury:
 - \$2,000,000 Each Occurrence
 - \$2,000,000 Aggregate
 - b. Property Damage:
 - \$2,000,000 Each Occurrence
 - \$2,000,000 Aggregate

- c. Products and Completed Operations to be maintained for 2 years after final payment: \$2,000,000 Aggregate
 - d. Property Damage Liability Insurance shall provide X, C and U coverage.
 - e. Broad Form Property Damage Coverage shall include Completed Operations.
3. Contractual Liability:
- a. Bodily Injury:
\$2,000,000 Each Occurrence
\$2,000,000 Aggregate
 - b. Property Damage
\$2,000,000 Each Occurrence
\$2,000,000 Aggregate
4. Personal Injury with Employment Exclusion deleted:
\$2,000,000 Aggregate
5. Business Auto Liability (including owned, non-owned, and hired vehicles):
- a. Bodily Injury:
\$2,000,000 Each Occurrence
\$2,000,000 Aggregate
 - b. Property Damage:
\$1,000,000 Each Occurrence
6. If the General Liability coverages are provided by a Commercial Liability policy, the:
- a. General Aggregate shall be not less than \$2,000,000 and it shall apply, in total, to this Project only.
 - b. Fire Legal Liability Limit shall be not less than \$50,000 on any one Fire.
 - c. Premises Medical Expense Limit shall be not less than \$5,000 on any one person.
7. Aircraft Liability (owned and non-owned) when aircraft are used in the performance of the Contract: \$2,000,000 (where applicable).
8. Watercraft Liability (owned and non-owned) when watercrafts are used in the performance of the Contract: \$2,000,000 (where applicable).
9. Umbrella Excess Liability:
\$3,000,000 over primary insurance.
\$50,000 retention for self-insureds hazards, each occurrence.
10. For Contracts involving asbestos or asbestos abatement: In addition to coverages noted above, Asbestos Liability Insurance, in a form acceptable to the Owner and written by an insurance company acceptable to the Owner, shall be provided prior to the commencement of the Work, in the amount of \$2,000,000 per occurrence.

61. Article 11, Subparagraph 11.1.5: Add the following new subparagraph 11.1.5 immediately after subparagraph 11.1.4 of this Agreement:

11.1.5: If the General Liability coverages are provided by a Commercial General Liability Policy, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in compliance with subparagraph 9.10.2

62. Article 11, Subparagraph 11.1.6: Add the following language at the end of subparagraph 11.1.3 of this Agreement:

The Certificates shall be ACORD Form 25S, accompanied by a completed AIA Document G715, Instruction Sheet and Attachment for ACORD Certificate of Insurance. The insurance required by subparagraph 11.1.1 shall be written to name the Owner and the Engineer as additional insureds. The Certificates shall reflect naming the Owner and Engineer as additional insureds and shall require thirty (30) days prior written notice to the Engineer and Owner of cancellation or termination.

63. Article 11, Subparagraph 11.1.7: Add the following new subparagraph 11.1.7 immediately after subparagraph 11.1.6 of this Agreement:

11.1.7 Contractor shall not commence work under this Contract until Contractor has obtained all the insurance required hereunder and until such insurance has been accepted by the Owner, nor on its subcontracts until all similar insurance required of the Subcontractors has been so obtained.

64. Article 11, Subparagraph 11.6: Add the following new subparagraph 11.6:

11.6 The Contractor shall furnish Performance Bonds and Labor and Material Payment Bonds each in the amount of the Contract Price. Bonds shall be written by a company licensed to sell surety bonds in the State of New York and the cost thereof shall be included in the Contract Sum.

11.6.1 The Contractor shall deliver the required bonds to the Owner on or before the execution of the Agreement.

11.6.2 The bonds shall be written on AIA Document A311, February 1970 Edition, Performance Bond and Labor and Material Payment Bond forms.

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

11.6.4 No work shall commence until the Owner has accepted the Bonds. The Owner shall have the right to reject the Contractor for failure to comply by the Contractor and the Contractor shall forfeit any bid security for failure to comply with bonding or insurance requirements.

65. Article 11, Paragraph 11.7: Add the following new paragraph 11.7 to Article 11 of this Agreement:

11.7 APPEARANCE OF COUNSEL

11.7 If an action for bodily injury and/or property damage is commenced against Owner or Architect, which in the opinion of Owner's or Architect's legal counsel or insurance coordinator is covered by the indemnity provisions of paragraph 3.18, Contractor shall, upon Owner's written request, promptly cause Contractor's insurance carrier to have

its attorneys appear timely in the action on behalf of Owner and/or Architect and provide the defense of Owner and/or Architect.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

66. Article 12, Subparagraph 12.2.2.1: Add the following sentence at the end of subparagraph 12.2.2.1 of this Agreement: "The Performance Bond shall remain in full effect and force through this period."

ARTICLE 13 - MISCELLANEOUS PROVISIONS

67. Article 13: Redesignate Paragraph 13 as subparagraph 13.1 and add the following new subparagraphs 13.1.1, 13.1.2 and 13.1.3 :

13.1.1 Specific reference is made to the following sections of the Labor Law and General Municipal Law which apply to the Work under this Contract.

13.1.1.1 Labor Law.

- .1 Section 220 Subd. 2, re: 8 hour day, 40 hour week.
- .2 Section 220, Subd. 3 and 220-d, re: Minimum Rates and Supplements, which are included in the Project Manual.
- .3 Section 220-e, re: Anti-discrimination, including all subparts.
- .4 Section 222-a, re: Prevention of dust hazards.

If in the construction of the work covered by the Contract, a harmful dust hazard is created for which appliances or methods for the elimination of harmful dust hazards have been accepted by the Architect or the Owner, such appliances or methods shall be installed and maintained and effectively operated by Contractor at its sole cost and expense, immediately on notification to the Contractor that such a harmful dust hazard exists.

13.1.1.2 General Municipal Law

- .1 Section 103-d re: Non-collusion. Contractor has subscribed, under penalty as provided by law, that the Contract Sum was arrived at independently, that the Contractor has made no agreement to restrict competition in any manner, and did not, prior to the bid opening, knowingly divulge its bid to any competitors.
- .2 Section 108, re: Workers' Compensation Insurance. This Contract shall be void and of no effect unless the person or corporation making or performing such Contract shall secure compensation for the benefit of, and keep insured during the life of the Contract, such employees, in compliance with the provisions of the Workers' Compensation Law.
- .3 Section 109, re: Non-assignment of Public Contracts. As provided in Section 109 of the General Municipal Law, the Contractor is prohibited from assigning, transferring, conveying, subletting or otherwise disposing of the same, or its right title, or interest therein, or its power to execute such contract to any other person or corporation without the previous consent in writing of the officer, board or agency awarding the contract. If any contractor, to whom any contract is let, granted and awarded, as required by law, by any officer, board or agency in a political subdivision, or of any district therein, shall without the previous written consent specified in subdivision 1 of this section, assign, transfer, convey, sublet

or otherwise dispose of such contract, or its right, title or interest therein, or its power to execute such contract, to any other person or corporation, the officer, board or agency which let, made, granted, or awarded such contract shall revoke and annul such contract, and the political subdivision or district therein, as the case may be, and such officer, board or agency shall be relieved and discharged from any and all liability and obligations growing out of such contract to such contractor, and to the person or corporation to which such contract shall have been assigned, transferred, conveyed, sublet or otherwise disposed of, and such contractor, and its assignees, transferees or sublessees shall forfeit and lose all monies, theretofore earned under such contract, except so much as may be required to pay its employees. The provisions of this section shall not hinder, prevent, or affect any assignment by any such contractor for the benefit of its creditors made pursuant to the laws of this state.

13.1.2. Each and every provision required by law to be inserted in the Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein and in the event any such provision is not inserted or is not correctly inserted the, upon the application of either party, this Contract shall forthwith be physically amended to make such insertion or corrections.

13.1.3 In the event a dispute arises out of this Contract or which in any way affects the rights of any of the parties to it, the Contractor agrees to bring any action, proceeding or other legal process only in the State court jurisdiction in which the project is located and in no other forum.

68. Article 13, Paragraphs 13.6 and 13.7: Add the following new paragraphs 13.6 and 13.7 to Article 13 of this Agreement:

13.6 EQUAL OPPORTUNITY

13.6.1 The Contractor shall maintain policies of employment as follows:

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

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

13.6.1.3 Affirmative Action Requirements - Equal Opportunity Employment. Contractor shall adhere to any local and applicable Affirmative Action, Equal Opportunity Employment Programs in the area of work. (If no quota is required in the area of this project, Affirmative Action requirements do not apply).

13.7 EQUIVALENTS

13.7.1 In the Specifications, where two or more kind, types, brands, or manufacturers of materials are named, they are regarded as the required standard of quality, and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, or manufacturer or material other than those named in the Specifications, Contractor shall indicate in writing, in accordance with the procedures outlined, what kind, type, brand, or manufacturer is proposed.

13.7.2 In the Specifications, the absence of an "or equal" clause is not meant to exclude competition.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

69. Article 14, Subparagraphs 14.2.1.5 through 14.2.1.12: Add the following new clauses .5 through .12 immediately after clause .4 of subparagraph 14.2.1 of this Agreement:

- .5 is more than 15 percent behind schedule, as measured by dividing the number of days behind schedule, as determined by the Architect jointly with the Owner, divided by the total number of days in the Work;
- .6 refuses or neglects to supply a sufficient quantity of materials or labor required to perform the Work according to accepted schedules;
- .7 fails to prosecute the Work with diligence and promptness;
- .8 files for bankruptcy or other debtor insolvency relief;
- .9 an act or omission by Contractor which stops, delays, interferes with, or damages the Work;
- .10 any other failure by Contractor to perform any other terms and conditions of the Contract;
- .11 a determination by Owner or Architect that the Work or any portion of the Work is not being performed in accordance with the Contract; or
- .12 disregards the authority of the Owner.

70. Article 14, Subparagraph 14.2.2: In the fourth line of subparagraph 14.2.2, after the word "notice", add the following language: "or three days' written notice, if the number of days between the date of commencement and date of Substantial Completion, including both those days, is thirty (30) days or less,".

ARTICLE 15 CLAIMS AND DISPUTES

71. Article 15, Subparagraph 15.1.2: Delete this Subparagraph 15.1. in its entirety.

SECTION 01 1000
SUMMARY OF CONTRACT(S)

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Warwick Central School District Capital Project
- B. Owner's Name: Warwick Valley Central School District.
- C. Engineer's Name: Eisenbach and Ruhnke Engineering, P.C.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: Multiple prime contracts, each based on a Stipulated Price as described in Document 00 5000 - Contracting Forms and Supplements.
- B. The work of each separate prime contract is identified in this section and on the Drawings.
 - 1. Contract #1 is for HVAC
 - a. The scope of work is to replace the Unit Ventilators and related equipment as indicated.
 - b. There is a base bid and an alternate portion for the project.
 - 2. Contract #2 is for Roofing
 - a. The roof work is to provide the structural support and roofing for the new VRF condensers.
 - b. There is a base bid and an alternate portion for the project.
 - 3. Electrical Work is being done by the District
 - a. The electrical work is for disconnecting and reconnecting the unit ventilators and extending power to the new rooftop condensers for the VRF system.

1.04 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Others.
 - 3. Work by Owner.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Existing building spaces may not be used for storage unless authorized by Owner.
- E. Storage is limited on the site. Contractors should assume that storage will be in containers they provide.
- F. Contractors are not allowed to use any materials or equipment belonging to the District, including, but not limited to, ladders, carts, brooms, garbage cans, etc. Use of a District owned ladder will result in the worker being permanently removed from the site.
- G. Contractors are responsible for their own clean up. Rooms are to be left as clean as found. If the District has to arrange for cleaning, the contractors will be back charged. During the summer, contractors can work as many hours as desired.
- H. Work hours:
- I. Before 7:00 AM - 7:00 PM with restriction for access while school is in progress. Weekend and Holiday work is also allowed.

- J. Utility Outages and Shutdown:
 - 1. Limit disruption of utility services to hours the building is unoccupied.
 - 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days' notice to Owner and authorities having jurisdiction.
 - 3. Prevent accidental disruption of utility services to other facilities.

1.06 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Engineer and Construction Manager.

1.07 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Unless otherwise noted, all provisions of the sections listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.
- B. Section 01 2000 - Price and Payment Procedures.
- C. Section 01 2100 - Allowances.
- D. Section 01 2300 - Alternates
- E. Section 01 3000 - Administrative Requirements.
- F. Section 01 4000 - Quality Requirements.
- G. Section 01 4216 - Definitions.
- H. Section 01 4219 - Reference Standards.
- I. Section 01 5000 - Temporary Facilities and Controls.
- J. Section 01 6000 - Product Requirements.
- K. Section 01 7000 - Execution and Closeout Requirements.
- L. Section 01 7800 - Closeout Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Change procedures.
- C. Procedures for preparation and submittal of application for final payment.

1.03 RELATED REQUIREMENTS

- A. Section 00 5200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
- B. Section 00 7200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.
- C. Section 01 2100 - Allowances: Payment procedures relating to allowances.

1.04 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G702/703.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date Letter of Award.
- E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.05 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form Identical form approved for Schedule of Values.
- C. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- D. Execute certification by signature of authorized officer.
- E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- F. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- G. Submit one (1) electronic "pencil copy", in PDF format, of each Application for Payment to Eisenbach & Ruhnke Engineering, P.C. for approval.
- H. After Engineer's approval of the "pencil copy" submit three hard copies to Eisenbach & Ruhnke

- I. Include the following with the application:
 - 1. Transmittal letter as specified for Submittals in Section 01 3000.
 - 2. Construction progress schedule, revised and current as specified in Section 01 3216.
 - 3. Partial Waivers of Mechanic's Lien: With each Application for Payment, submit partial waivers of mechanic's liens from contractor, subcontractors, sub-subcontractors and suppliers for construction period covered by the previous application.
 - a. Waiver Forms: Submit waivers of lien on forms.
 - 4. When an application shows completion of an item, submit final or full waivers.
 - 5. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 6. Submit Final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - 7. Certified Payrolls; All Applications for Payment must be accompanied with certified payrolls for all Contract Work performed. In addition, each contractor and sub-contractor shall submit to the Owner within thirty days after issuance of its first payroll, and every thirty days thereafter, a transcript of the original payroll record subscribed and affirmed as true under penalties of perjury. The Owners shall be required to receive and maintain such payroll records. The original payrolls or transcripts shall be preserved for three years from the completion of the work on the awarded project.
 - a. Submit certification that all personnel listed on certified payrolls have successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.
- J. Liens: No Payment will be made when a lien is filed against Owner by contractor or any subcontractor, or supplier or other entities until such lien is removed, bonded or similar action acceptable to the Owner
- K. Project record documents as specified in Section 01 7800, shall be available for review by Warwick CSD as a prerequisite for approval of payment.
- L. Affidavits attesting to off-site stored products and insurance certificates covering all site material and equipment.
- M. When Eisenbach and Ruhnke Engineering, P.C. requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- N. The Owner shall retain Five (5) percent of the amount of each payment

1.06 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

- A. Comply with Requirements of Section 01 7800 - Closeout Submittals.

1.07 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor.
- C. For other required changes, Engineer will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Engineer will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 2 days.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

1. For change requested by Engineer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Engineer.
 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
 4. For change ordered by Engineer without a quotation from Contractor, the amount will be determined by Engineer based on the Contractor's substantiation of costs as specified for Time and Material work.
- F. Substantiation of Costs: Provide full information required for evaluation.
1. On request, provide the following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 2. Support each claim for additional costs with additional information:
- G. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

1.08 APPLICATIONS FOR PAYMENT WHEN BEHIND SCHEDULE

- A. When the project falls behind schedule the contractor shall demonstrate the actions to be taken to put the project back on schedule.
1. Payments will not be approved until satisfactory evidence is presented to put the project on schedule.

1.09 APPLICATION FOR PAYMENT AFTER SCHEDULED COMPLETION DATE

- A. In the event the work is not completed by the schedule date, listed in Section 01100 Summary of Work, and in addition to the other remedies described, the Engineer will not review progress payment requisitions submitted after the construction completion date, and the District will not issue any progress payments after that date, until all work is completed.
1. Only one requisition for work performed, after the construction completion date, may be submitted, and it may be submitted only when all work is complete and a Punch List inspection is conducted; said requisition may be submitted when the work at 100% complete, less 5% retainage.

1.10 APPLICATION FOR FINAL PAYMENT

- A. It is understood by the Contractor that the maximum payment due the contractor prior to final payment shall be Ninety-Five (95%) of the Contract amount and the final Five (5%) will be due only after the completion and submittal of all requirements of Section 01780 Closeout Submittals are met, including completion of all "punch list" items.
- B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 7000.
 2. All "punch list" items have been completed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2100
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contingency allowance.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- B. Funds will be drawn from the Contingency Allowance only by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

- A. CONTRACT #1 HVAC
 - 1. ALLOWANCE
 - a. Include an allowance for use according to the Owner' instructions
Twenty Thousand (\$20,000) DOLLARS
- B. CONTRACT #2 ROOFING
 - 1. ALLOWANCE - NONE

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.

1.02 RELATED REQUIREMENTS

- A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

1.03 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SCHEDULE OF ALTERNATES

A. CONTRACT #1 – HVAC

1. ALTERNATE H-1

- a. The base bid includes the replacement of unit ventilators as indicated and related work.
- b. The alternate is for the contractor to replace the units indicated as an alternate

B. CONTRACT #2 – Roofing

1. ALTERNATE R-1

- a. The base bid includes the roofing related to providing the new VRF condensers on the roof.
- b. The alternate is for the roofing related to the alternate VRF Condensers.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electronic document submittal service.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Construction progress schedule.
- E. Coordination drawings.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions: Dates for applications for payment.
- B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 PROJECT/CONSTRUCTION MANAGER

- A. Project Manager: Eisenbach & Ruhnke Engineering, P.C.
- B. Cooperate with the Project/Construction Manager in allocation of mobilization areas of site, for field offices and sheds, for building access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Manager.
- D. Comply with Project/Construction Manager's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project/Construction Manager for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary of Contracts.
- F. Coordinate field engineering and layout work under instructions of the Project Manager.
- G. Make the following types of submittals to Engineer through the Project Manager:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Engineer.
 - 3. Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.

5. Designation of personnel representing the parties to Contract, Owner and Engineer.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
1. Contractor.
 2. Owner.
 3. Engineer.
 4. Contractor's superintendent.
 5. Major subcontractors.
- C. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Maintenance of progress schedule.
 7. Corrective measures to regain projected schedules.
 8. Planned progress during succeeding work period.
 9. Maintenance of quality and work standards.
 10. Effect of proposed changes on progress schedule and coordination.
 11. Other business relating to work.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.04 COORDINATION DRAWINGS

- A. Provide information required by Project Manager for preparation of coordination drawings.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Engineer's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 01 7800 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

- A. General Requirements:
- B. Shop Drawing Procedures:
 - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
 - 2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- C. Transmit each submittal with a copy of approved submittal form.
- D. Transmit each submittal with approved form.
- E. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- F. Identify Project, Contractor, Subcontractor or supplier, pertinent drawing and detail number, and specification section number, as appropriate on each copy.

- G. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- H. Schedule submittals to expedite the Project, and coordinate submission of related items.
- I. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- J. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- K. Provide space for Contractor and Engineer review stamps.
- L. When revised for resubmission, identify all changes made since previous submission.
- M. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- N. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 3060
NON-DISCRIMINATION CLAUSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.
- B. During the performance of this contract, the contractor agrees as follows:
 1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color or national origin, and will take affirmative action to insure that they are afforded equal employment opportunities without discrimination because of race, creed, color or national origin. Such action shall be taken with reference, but not be limited, to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the job training.
 2. The contractor will send to each labor union or representative of workers with which he has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commission for Human Rights, advising such labor union or representative of the contractor's agreement under these clauses hereinafter called "non-discrimination clauses" and requesting such labor union or representative to agree in writing, standing or otherwise, that such labor union or representative will not discriminate against any member or applicant for membership because of race, creed, color or natural origin. Such action shall be taken with reference, but not limited, to: recruitment, employment job assignment, promotion, upgrading, demotion, transfer, layoff, or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training. Such notice shall be given by the Contractor, and such written agreement shall be made by such labor union or representative, prior to the commencement of performance of this contract. If such labor union or representative fails or refuses so to agree in writing the Contractor shall promptly notify the State Commission of Human Rights of such failure or refusal.
 3. The Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses and such provisions of the State's laws against discrimination as the State Commission for Human Rights shall determine.
 - a. The Contractor will state, in all solicitation or advertisements for employees placed by or on behalf of the contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.
 - b. The Contractor will comply with the provisions of Section 291-299 of the Executive Law and the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to his books, records and accounts by the State Commission for Human Rights, the Attorney General and the Industrial Commissioner for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.
 - c. This contract may be forthwith canceled, terminated or suspended, in whole or in part by the Owner upon the basis of a finding made by the State Commission for Human Rights that the contractor has not complied with these nondiscrimination clauses, and the Contractor may be declared ineligible for future contracts made by or on behalf of the Owner or agency of the Owner, until he or it satisfies the State Commission for Human Rights that he or it has established and is carrying out a program in conformity with the provisions of these non-discrimination clauses. Such findings shall be made by the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these nondiscrimination clauses and after a verified complaint has been filed with the Commission, notice thereof has been given to the Contractor and an opportunity has been

afforded him to be heard publicly before three members of the Commission. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions or remedies otherwise provided by law.

- d. If this Contract is canceled or terminated under the above clause, in addition to other rights of the Owner, provided in this contract upon its breach by the Contractor, the Contractor will hold the Owner harmless against any additional expenses or costs incurred by the Owner in completing the work or in purchasing the services, materials, equipment or supplies contemplated by this contract, and the Owner may withhold payments from the contractors in an amount sufficient for this purpose and recourse may be had against the surety on the performance bond if necessary.
- e. The Contractor will include the provisions of these clauses in every sub-contract or purchase order in such a manner that such provisions will be binding upon each sub-contractor or vendor as to operations to be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such Sub-Contract or purchase order as the contracting agency may direct, including sanctions or remedies for non-compliance. If the contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor shall promptly so notify the Attorney General, requesting him to intervene and protect the interests of the Owner.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.

1.02 RELATED SECTIONS

- A. Section 01 1000 - Summary of Contract(s): Work sequence.

1.03 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.
- C. Within 5 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- D. Submit updated schedule with each Application for Payment.
- E. Submit under transmittal letter form specified in Section 01 3000 - Administrative Requirements.

1.04 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one year's minimum experience in scheduling construction work of a complexity comparable to this Project and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: 3 years minimum experience in using and monitoring CPM schedules on comparable projects.

1.05 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: Maximum 22 x 17 inches.
- C. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first workday of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Engineer at each submittal.

- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 3300
SED SPECIAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies special requirements of State Education Department, including Commissioner's Regulation Part 155.5, 155.7
 - 1. Copies of Commissioner's Regulation Part 155.5, 155.7 are available on the State Education Department's web site.

1.03 CERTIFICATE OF OCCUPANCY

- A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a Certificate of Occupancy.

1.04 GENERAL SAFETY AND SECURITY DURING CONSTRUCTION

- A. All construction materials shall be stored in a safe and secure manner.
 - 1. Fences around construction supplies or debris shall be maintained.
 - 2. Gates shall always be locked unless a worker is in attendance, to prevent unauthorized entry.
 - 3. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
 - 4. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

1.05 SEPARATION OF CONSTRUCTION

- A. Separation of construction areas from occupied spaces. Construction areas that are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Metal stud and gypsum board (Type X) must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
 - 1. A specific stairwell and/or elevator may be assigned for construction worker use during work hours, when approved by the Owner. Workers may not use corridors, stairs or elevators designated for students or school staff.
 - a. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
 - b. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each work day. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

1.06 FIRE PREVENTION

- A. There is no smoking on school property for fire prevention and New York State Law.
- B. Any holes in floors or walls shall be sealed with a fire resistant material.
- C. Contractor shall maintain existing fire extinguishers.
- D. Fire alarm and smoke detection systems shall remain in operation at all times.

1.07 CONSTRUCTION DIRECTIVES

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

1. Construction Fume Control: Each Contractor shall be responsible for the control of chemical fumes, gases, and other contaminants produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.
2. Off-Gassing Control. Each Contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc., are scheduled, cured or ventilated in accordance with manufacturer's recommendations before a space can be occupied.

1.08 ASBESTOS

- A. Asbestos/Lead Test Asbestos Letter. Indication that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and asbestos.
- B. Asbestos Code Rule 56. Large and small asbestos abatement projects as defined by 8 NYCRR 155.5(k) shall not be performed while the building is occupied. Note: It is SED's interpretation that the term "building" as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non combustibile construction. The isolated portions (the occupied portion and the portion under construction) of the building must contain separate code compliant exits. The ventilation systems must be physically separated and sealed at the isolation barrier(s).
 1. Asbestos TEM. The asbestos abatement area shall be completely sealed off from the rest of the building and completely cleaned and tested by TEM prior to re-entry by the public.
 2. Lead Abatement Projects. A project that contains materials identified to be disturbed which tests positive for lead shall include that information in the Construction Documents. The Construction Documents must address the availability of lead testing data for the building and include a statement that the OSHA regulations be followed and that cleanup and testing be done by HUD protocol.

1.09 VENTILATION

- A. The work, as scheduled in the existing building, is to be performed when the facility is unoccupied. In the event that work is required to be performed during times when the building is occupied, all existing ventilation system between areas of work and areas of occupancy shall be disconnected, separated and code complying ventilation requirements be provided the occupied area. Prior to such work commencing the contractor shall submit a plan, for review indicating procedure to be taken. Also see paragraph 1.5 above for additional requirements.”

1.10 ELECTRICAL CERTIFICATION:

- A. The Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation if applicable.

1.11 EXITING

- A. Exiting: Work will be performed when school is not in session or after school hours. All exiting will be clear and usable at all times.
- B. All exits shall be clear and usable at all times.
- C. All modifications or changes to the exiting plan shall be approved by the Architect.

1.12 CONSTRUCTION WORKER IN OCCUPIED AREAS

- A. No worker shall be permitted in areas occupied by students. If access is required by the contractor's personnel they will be supervised by District personnel. Contractor shall provided 24 hour notice to the Owner when such access will be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 3323

SHOP DRAWINGS, SUBMITTALS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Section 01 3000 Administrative Requirements
- B. Submit, to the Engineer, shop drawings, product data, and samples required by the specification sections.
- C. Attached is the Submittal Cover Sheet (Section 01 3323.01) that is to be filled out and returned to the Engineer with each submittal.
- D. Make submittals to allow for checking, re-submittal, and rechecking, if required, without causing delay of the Construction Schedule.

1.02 PRODUCT DATA

- A. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, and other standard descriptive data.
 - 1. Modify product data to delete information that is not applicable to project.
 - 2. Supplement standard to provide additional information applicable to project.
 - 3. Clearly mark each copy to identify applicable materials, products, or models.
 - 4. Show dimensions and clearances required.
 - 5. Show performance characteristics and capacities.
 - 6. Show wiring or piping diagrams and controls.

1.03 CONTRACTOR RESPONSIBILITIES

- A. Review, approve, stamp, and sign shop drawings, submittals, product data, and samples prior to submission to Engineer.
- B. Verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and other data.
- C. Coordinate each submittal with requirements of Work and Contract Documents.
- D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittals.
- E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Engineer's review of submittals unless Engineer gives written acceptance of the specific deviations.
- F. Notify Engineer in writing, at time of submission, of deviations in submittals from requirements of Contract Documents.
- G. After Engineer's review, Contractor is to distribute copies of submittals to parties requiring same for co-ordination of work.
- H. Make required copies for distribution of shop drawings and product data that have been stamped and signed by the Engineer.

1.04 SUBMISSION REQUIREMENTS

- A. Submit number of copies of product data that will be required for distribution plus one copy that will be retained by Engineer.
- B. Accompany submittal with transmittal letter, containing:
 - 1. Date.
 - 2. Engineer's project title and number.
 - 3. Contractor's name and address.
 - 4. Notification of deviations from Contract Documents.

5. Additional pertinent data.
- C. Submittals shall include:
 1. Date and revision dates.
 2. Engineer's project title and number.
 3. The names of:
 - a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 4. Identification of product.
 5. Relation to adjacent structure or materials.
 6. Field dimensions, clearly identified as such.
 7. Technical Specification section number.
 8. Applicable standards.
 9. A blank space, 4 x 4 inches, for the Engineer's stamp.
 10. Identification of deviations from Contract Documents.
 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, and compliance with Contract Documents.
 - a. Submittals without Contractor's stamp will be returned without being reviewed.
- D. Shop Drawing Submittal Cover Sheet
 1. Attach submittal cover sheet, with all blanks filled in for each shop drawing, product data, and sample.

1.05 RESUBMISSION REQUIREMENTS

- A. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.06 CONTRACTOR'S DISTRIBUTION OF SUBMITTALS

- A. Distribute copies of shop drawings and product data that carry the Engineer stamp to:
 1. Contractor's file.
 2. Job site file.
 3. Record Document file.
 4. Construction Manager.
 5. Owner
- B. Distribute samples as directed by Engineer.

1.07 ENGINEER

- A. Stamp and initial or sign certifying to review of submittal.
- B. Explanation of Engineer's Stamp:
 1. NO EXCEPTION TAKEN: No corrections, no marks.
 2. MAKE CORRECTIONS NOTED: Minor amount of corrections; all items can be fabricated at Contractor's risk without further correction; checking is complete and all corrections are obvious without ambiguity.
 3. REVISE AND RESUBMIT: Minor amount of corrections; noted items must not be fabricated without further correction; checking is not complete; details of items noted by checker are to be further clarified; items not noted to be corrected can be fabricated at Contractor's risk under this stamp.
 4. REJECTED: Drawings are rejected as not in accordance with the Contract, too many corrections, or other justifiable reason. The drawing must be corrected and resubmitted. No items are to be fabricated under this stamp.
 5. SUBMIT SPECIFIED ITEM: Item is not as specified. Submit named manufacturer.
- C. Return submittals to Contractor for distribution.

1.08 SUBMITTALS REQUIRED FOR REVIEW

- A. The following is the Submittal Cover Sheet for the required submittals. Contractor is responsible for reviewing each section to determine required submittals.

END OF SECTION

SUBMITTAL COVER SHEET



EISENBACH & RUHNKE ENGINEERING, P.C.
291 Genesee St., Utica, NY 13501 315-735-1916

The Contractor shall fill out lines 1 through 7 below and staple this cover sheet to submitted product data sheet, sample, shop drawing, or other items submitted to the Architect/Engineer. Each submittal shall have its own Submittal Cover Sheet.

Project Name: Warwick Valley School District
E&R Project No.: 05-21-04 High School – Unit Ventilator Replacement & Air Conditioning Upgrade
Email Submittals to: **WarwickSubmittals@erengpc.com**
Architect/Engineer: Eisenbach and Ruhnke Engineering, P.C.
Project Manager: Jack Eisenbach jeisenbach@erengpc.com
Address: 291 Genesee Street
Utica, NY 13501
Phone: 315-735-1916

Contractor:
Project Manager:
Address:
Phone:
Owner: Warwick Valley Central School District

-
1. Date: _____
 2. Submittal Number: _____
 3. Submitted Item: _____
 4. Manufacturer: _____
 5. Person Submitting: _____
 6. Spec. Location: Section _____ Article _____ Paragraph _____ Subparagraph _____
 7. And/Or Drawing Number: _____
- Architect/Engineer’s Notes: _____
- _____
- _____
- _____
- _____
- _____
- _____

Contractor’s Stamp

Architect/Engineer’s Stamp

- No exception taken.
- Make Corrections Noted. Do not resubmit. See Notes above.
- Submit Specified Item. Resubmit. See Notes above.
- Revise and Resubmit. Resubmit. See Notes above.
- Rejected. See Notes above.

Checking of submittals is only for general conformance with the design concept of the Project and general compliance with the information given in Contract Documents. Any action shown is subject to the requirements of the Drawings and Specifications. Contractor is responsible for dimensions to be confirmed and correlated at the job site, quantities, information that pertains solely to the fabrication processes or to techniques of construction, coordination of the work of all trades, and the satisfactory performance of his work.

By: _____ Date: _____
EISENBACH & RUHNKE ENGINEERING

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. References and standards.
- C. Testing and inspection agencies and services.
- D. Control of installation.
- E. Manufacturers' field services.
- F. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Document 00 7200 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 01 4216 - Definitions.
- D. Section 01 4219 - Reference Standards.
- E. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- B. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

1.03A CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Engineer's knowledge and action as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
 - 1. Include required product data and shop drawings.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.

- f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Engineer, provide interpretation of results.
2. Test report submittals are for Engineer's knowledge as construction contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
- G. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.05 REFERENCES AND STANDARDS

- A. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- B. Obtain copies of standards where required by product specification sections.
- C. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- B. Contractor Employed Agency:
 1. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 2. Laboratory: Authorized to operate in the State in which the Project is located.
 3. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step-in sequence.

- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Engineer.
 - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.03 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.04 DEFECT ASSESSMENT

- A. Replace work or portions of the work not conforming to specified requirements.

END OF SECTION

SECTION 01 4100
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY OF REFERENCE STANDARDS

- A. Regulatory requirements applicable to this project are the following:
- B. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.
- C. NFPA 101 - Life Safety Code; 2015.

1.03 CODES, PERMITS, FEES, ETC.

- A. The Owner shall file and obtain the Building Permit.
- B. Each Contractor shall furnish and pay for all permits, fees and other installation costs required for the various installations by governing authorities and utility companies; prepare and file drawings and diagrams required; arrange for inspections of any and all parts of the work required by the authorities and finish all certificates necessary to the Construction Manager as evidence that the work installed under this Section of the Specifications conforms with all applicable requirements of the Municipal and Stat Codes, National Board of Fire Underwriters, National Electric Code.
- C. Any items of work specified herein and shown on the drawings which conflict with aforementioned rules, regulations and requirements, shall be referred to the Engineer and Construction Manager for decision which decision shall be final and binding.
- D. The work shall not be deemed to have reached a state of completion until the certificates have been delivered.
- E. The building is to be constructed under the following Rules and Regulations of the New York State Uniform Fire and Building Codes known as the "Building Codes of the State of New York" and consists of the following:
 - 1. Building Code of New York State
 - 2. State Education Department Planning Standards, including Commissioner's Regulation Part 155.5, 155.7
 - 3. Energy Conservation Construction Code of the New York State
 - 4. Fire Code of New York State
 - 5. Fuel Gas Code of New York State
 - 6. Mechanical Code of New York State
 - 7. Plumbing Code of New York State.
- F. Classification of Construction
- G. Occupancy Classification: Education E
- H. State Education Department: Planning Standards is applicable to the work. Any conflicts between the Building Codes of New York and the State Education Department Planning Standards, the most restrictive shall apply. Copies of the Planning standards are available at the SED website.
- I. Electrical Certification: The Contractor shall obtain UL Certification or Inspection from a Certified Electrical Organization for electrical installation.
- J. OSHA Part 1926 Safety and Health Regulations for construction.

1.04 MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

- A. All laborers, workers and mechanics working on the site are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project. Certification shall be within the last five (5) years.

1.05 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements.
- B. Section 01 4219 - Reference Standards.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Building Name and Address.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4216
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Provide: To furnish and install.
- E. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4219
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements relating to referenced standards.

1.02 RELATED REQUIREMENTS

- A. Document 00 72 00 - General Conditions: Reference standards.

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.04 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract and Section 01 1000 Summary of Contracts.

1.05 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents, including reference standards in codes having jurisdiction, include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.
- C. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
- D. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

PART 2 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.01 ABBREVIATIONS AND NAMES:

- A. Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

PART 3 – NOT APPLICABLE

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Waste removal facilities and services.
- G. Project identification sign.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 for submittals

1.03 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Mobile phone service for all field superintendents and foreman.

1.04 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.06 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.07 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.08 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings.

- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5060
SITE SAFETY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY:

- A. The purpose of this section is to specify the safety requirements, which must be followed by each Contractor during the execution of this contract.
- B. Each Contractor agrees that the work will be completed with the greatest degree of safety and:
 - 1. To conform to the requirements of the Occupational Safety and Health Act of 1970 (OSHA) and the Construction Safety Act of 1969, including all standards and regulations that have been or shall be promulgated by the governmental authorities which administer such acts, and shall hold the Owner, Owner's Representative, the Architect, and all their employees, consultants and representatives harmless from and against and shall indemnify each and every one of them for any and all claims, actions, liabilities, costs and expenses, including attorneys fees, which any of them may incur as a result of non-compliance.

1.03 RELATED SECTIONS

- A. Section 01 5000 - Temporary Facilities and Controls.

1.04 DEFINITIONS

- A. Public shall mean anyone not involved with or employed by the contractor to perform the duties of this contract.
 - 1. Site shall mean the limits of the work area.
 - 2. Contractor shall mean the contractor, his/her subcontractors and any other person related to the contract execution.

1.05 REFERENCES:

- A. Code of Federal Regulations OSHA Safety and Health.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Barriers shall be constructed of sturdy lumber having a minimum size of 2'x 4'.
- B. Signs shall be made of sturdy plywood of 1/2" minimum thickness and shall be made to legible at a distance of 50 feet.

PART 3 - EXECUTION

3.01 GENERAL

- A. In the performance of its contract, each Contractor shall exercise every precaution to prevent injury to workers and the public or damage to property.
 - 1. Each Contractor shall, at their own expense, provide temporary structures, place watchmen, design and erect barricades, fences, and railings, give warnings, display such lights, signals and signs, exercise such precautions against fire, adopt and enforce such rules and regulations, and take such other precautions as may be necessary, desirable or proper or as may be directed.
 - 2. Each Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work to be done under this contract. Each Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss including but not limited to:
 - a. All employees working in connection with this contract, and other persons who may be affected thereby.

- b. All the work materials and equipment to be incorporated therein whether in storage on or off site; and including trees, shrubs, lawns, walks, pavements, facilities not designated for removal, relocation or replacement in the course of construction.
- B. Each Contractor's duties and responsibilities for the safety and protection of the work: shall continue until such time as all the work is completed and contractor has removed all workers, material and equipment from the site, or the issuance of the certificate of final completion, whichever shall occur last.
- C. Each Contractor shall use only machinery and equipment adapted to operate with the least possible noise, and shall so conduct his operations that annoyance to occupants of the site and nearby homes and facilities shall be reduced to a minimum
- D. It shall be the responsibility of each Contractor to ensure that all employees of the contractor and all subcontractors, and any other persons associated with the performance of their contract shall comply with the provisions of this specification.
- E. Each Contractor shall clean up the site daily and keep the site free of debris, refuse, rubbish, and scrap materials. The site shall be kept in a neat and orderly fashion. Before the termination of the contract, each Contractor shall remove all surplus materials, falsework, temporary fences, temporary structures, including foundations thereof.
- F. Each Contractor shall follow all rules and regulations put forth in the Code of Federal Regulations (OSHA Safety and Health Standards).

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage, and protection.
- C. Product option requirements.
- D. Substitution limitations.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- B. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary of Contracts: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
 - 1. Minimum of 3 years of documented experience.

1.06 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- C. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.07 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Engineer before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - 4. Verify that abandoned services serve only abandoned facilities.
 - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- H. Clean existing systems and equipment.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- J. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- G. Clean site: sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Engineer when work is considered ready for Engineer's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.
- H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 7329
CUTTING AND PATCHING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere
 - 1. Summary of Contract: Section 01 1000.
- B. Cutting and patching covers adjustment to, and necessary reworking of, elements of construction in existing work. The following definitions for cutting and patching apply to this Contract.
 - 1. Cutting: Physical modification of existing construction work, or removal of existing materials.
 - 2. Patching: Restoration or replacement and installation of construction material, both new and existing, including finishing and patching.
- C. Execute cutting, fitting, or patching of work, required to:
 - 1. Install specified work in existing construction.
 - 2. Remove existing construction.
 - 3. Provide equipment, labor, and incidentals necessary for cutting and patching as required for the installation of work in existing walls, floors, and ceilings. Patching must match adjacent material and finish.
- D. Coordination
 - 1. Coordinate the Work to minimize cutting and patching.
- E. In addition to Contract requirements, upon written instructions of Engineer:
 - 1. Uncover work to provide for Engineer's observation of covered work.
 - 2. Remove samples of installed materials for testing.
- F. Do not endanger work by cutting or altering work or any part of it.

1.02 SUBMITTALS

- A. Should conditions of work, or schedule, indicate change of materials or methods, submit written recommendation to Engineer, including:
 - 1. Conditions indicating change.
 - 2. Recommendations for alternative materials or methods.
 - 3. Submittals as required for substitutions.
- B. Submit written notice to Engineer designating time work will be uncovered, to provide for observation.

1.03 PAYMENT FOR COSTS

- A. Costs caused by ill-timed or defective work, or work not conforming to Contract Documents, including costs for additional service of Engineer will be paid for by the party responsible for ill-timed, rejected, or non-conforming work.

PART 2 – PRODUCTS

2.01 MATERIALS FOR REPLACEMENT OF WORK REMOVED

- A. Comply with specifications for type of work to be done.
- B. Match existing adjoining materials.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Inspect existing condition of work including elements subject to movement or damage during removal of adjacent materials.

3.02 PREPARATION

- A. A. Prior to Cutting
 - 1. Provide shoring, bracing, and support as required to maintain structural integrity of project.
 - 2. Provide protection for materials on adjacent surfaces.
 - 3. Provide protection when work will be exposed to the elements.

3.03 PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.
- B. Restore work that has been cut or removed. Provide new products to complete work in accordance with requirements of Contract Documents.
- C. Refinish entire surfaces as necessary to provide an even finish.
 - 1. Continuous Surfaces: To nearest intersections.
 - 2. Assembly: Entire refinishing.
- D. Fill and patch openings and holes in existing construction when bolts, piping, ducts, conduit, and other pen-etrating items are removed.

END OF SECTION

SECTION 01 7330
SELECTIVE REMOVALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract apply to this Section.

1.02 DESCRIPTION OF WORK:

- A. Location of selective removal work is indicated on drawings only in a general manner and it is not all inclusive in the overall scope of removal work. The Contractor shall provide all-inclusive removals required for new and renovated work.
 - 1. The Contractor will be responsible for all related removals and re-work of the existing systems, as required for new work.

1.03 SUMMARY

- A. This Section includes but is not limited to the following:
 - 1. Demolition and removals of selected portions of a building or structure.
 - 2. Repair procedures for selective removals operations.
 - 3. Patching of all areas of cutting and removals.

1.04 RELATED SECTIONS

- A. Section 01 4000 - Quality Requirements: Testing and inspection procedures
- B. Section 01 5000 - Temporary Facilities and Controls
- C. Section 01 7419 - Construction Waste Management and Disposal

1.05 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvages, or removed and reinstalled.
 - 1. Protect construction indicated to remain against damage and soiling during selective removals.
- C. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished shall become Contractor's property and shall be removed from the Project site.
- D. Removal and Reinstall: Each item from existing construction, prepare them for reuse, and reinstall them where indicated.

1.06 SUBMITTALS

- A. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- B. Schedule of selective removals Activities: Indicate the following:
 - 1. Detailed sequence of selective removals and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
- C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.07 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective removals. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Pre demolition Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 "Administrative Requirements". Review methods and procedures related to selective removals, including, but not limited to the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective removals schedule and verify availability of materials, demolitions, personnel equipment, and facilities needed to make progress and avoid delays.

1.08 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective removals area. Conduct selective removals so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 2. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- B. Owner assumes no responsibility for condition of areas to be selectively demolished.
- C. Hazardous Materials: Hazardous materials are present in building. A report on the presence of hazardous materials is attached. Examine report to become aware of locations where hazardous materials are present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

1.09 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective removals, by methods and with materials so as not to void existing warranties.
 1. Existing roofing is under warranty. Remove material by sub-contractors authorized and approved by manufacturer.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 2. Use materials whose installed performance equals or surpasses that of existing materials.
 3. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective removals required.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.

3.02 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective removals and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Protect existing site improvements, appurtenances, and landscaping to remain.
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- E. Provide protection to ensure safe passage of people around selective removals area and to and from occupied portions of building.

- F. Provide temporary weather protection, during interval between selective removals of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- G. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective removals operations.
- H. Cover and protect furniture, furnishings, and equipment that have not been removed.
- I. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- J. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- K. The following procedures shall be followed when door, frames, flooring and roofing are removed and do not contain asbestos:
 - 1. Asbestos and lead containing material shall be removed as per asbestos and lead abatement sections of the specifications.
 - 2. Work must be in compliance with OSHA Construction Standard (29 CFR 1926.62).
 - 3. Windows directly below, above, and adjacent to the work area shall be closed.
 - 4. Provide tarps on the floor of the space to catch all dust, debris etc are being removed
 - 5. All existing casework, furniture, books, computers and similar shall be provided one layer of six mil plastic.
 - 6. All air vents in the room shall be closed and/or shut off and sealed.
 - 7. Access to all rooms undergoing removals shall be restricted to prevent unauthorized entry.
 - 8. All moveable objects will be moved from the room by the Owner. The Contractor shall cover floor with a drop cloth or similar protection approved by the Architect.
 - 9. Contractor shall provide labor for daily cleanup on the interior and exterior of the building as required or directed by the Owner's Representative. Any visible debris shall be removed daily. Only wet cleaning methods and/or HEPA vacuuming shall be used to clean.
 - 10. All debris disposed of properly in accordance with Federal, State and Local Regulations. Refer to Section 01 50 00 "Temporary Facilities" for containers required.
 - 11. At completion of the work in each area the area shall be HEPA vacuumed and wet wiped.
 - 12. All corridors used by Contractors shall be protected and mopped and left clean daily

3.03 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- B. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- D. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- E. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective removals operations. Return adjacent areas to condition existing before selective removals operations began.

3.04 SELECTIVE REMOVALS

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Locate selective removals equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 2. Dispose of demolished items and materials promptly.

3. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective removals operations.
4. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective removals. When permitted by Architect, items may be removed to a suitable, protected storage location during selective removals, cleaned, and reinstalled in their original locations after selective removals operations are complete.
5. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for roofing requirements.

3.05 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective removals operations.
 1. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 2. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
 3. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
 4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

- A. Sweep the building broom clean on completion of selective removals operation.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 6. Fluorescent lamps (light bulbs).
- E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- F. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 - 2. Submit Report on a form acceptable to Owner.
 - 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 4. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 5. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
 - 6. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 – PRODUCTS – NOT USED A

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Engineer.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 1. Pre-bid meeting.
 2. Pre-construction meeting.
 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 1. Provide containers as required.
 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Engineer with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 3 EXECUTION

2.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Addenda.
 - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Contract drawings.

2.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

2.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

2.05 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel, aluminum, and other items.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- C. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2014.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

SECTION 07 5010
MODIFICATIONS TO EXISTING ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Portions of the existing roof is under warranty. Coordinate with Owner's representative for further information.
 - 1. Contractor must notify and be authorized by the manufacturer to perform all work as per the manufacturer's instruction.
 - 2. Refer to paragraph 1.12
- B. Modification to existing sprayed polyurethane foam roofing.
- C. Modification to existing underlying modified bituminous membrane roofing.
- D. Remove all existing membrane, insulation, flashings, and vapor barrier as required to provide and install mechanical equipment and curbs as shown on drawings.
- E. Roof top mechanical equipment work is specified else-where. Coordinate with the mechanical contractors to set new curbs and equipment, and make modifications to the existing curbs and equipment; then install new roof flashings as indicated.
- F. Maintain building watertight at all times.
- G. Install new support steel and decking; insulation to finish flush with existing the deck substrate, new insulation and roofing to make the building permanently watertight.
- H. Comply with the published recommendations and instructions of the roofing membrane manufacturer.
- I. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 for definition of terms related to roofing work not otherwise defined in the section.

1.4 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2016.
- D. ASTM D3909/D3909M - Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules; 2014.
- E. ASTM D2626/D2626M - Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing; 2004 (Reapproved 2012).
- F. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2013.
- G. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2013.

- H. ASTM D6380/D6380M - Standard Specification for Asphalt Roll Roofing (Organic Felt); 2003 (Reapproved 2013).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- J. FM 4470 - Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction; 2012.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Before start of roofing work, General Construction Contractor shall hold a meeting to discuss the proper installation of materials, status of the existing warranty and requirements to maintain the existing warranty and requirements to maintain the existing warranty.
 - 1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
 - 2. Notify Owner's Representative well in advance of meeting.

1.6 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's printed data sufficient to show that all components of roofing systems, including insulation and fasteners, comply with the specified requirements and with the roofing manufacturer's requirements and recommendations for the system type specified; include at least the following:
 - a. Technical data sheet for each roof membrane and fabric type.
 - b. Technical data for spray foam and coatings.
 - 2. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
 - 3. Pre-Work Site and Building Inspection Report with photos to documents conditions before commencing work.
 - 4. Written certification from the manufacturer which states that the installer is acceptable or licensed to install the specified roofing; if not previously provided.
- C. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications for all systems under warranty.

1.7 CODE APPROVAL REQUIREMENTS

- A. Install roofing and insulation system components to meet the following minimum requirements:
 - 1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.

1.8 QUALITY ASSURANCE

- A. Portions of Existing Roof is under warranty.
 - 1. Contractor must notify and be authorized by the manufacturer to perform all work as per the manufacturer's instruction.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.
- C. Installer Qualifications: Roofing installer shall have the following:
- D. Material Quality: Obtain each product, including the insulation, cover board, PVC roofing and flashing, and cements, primers and adhesives produced by a single Manufacturer, which has manufactured the same products in the United States of America for not less than 5 continuous years.
- E. Pre-Work Conference: Meet at the project site approximately one week prior to starting roof work, with the Owner's Representative and Architect and other representatives concerned about the work, to discuss the following:

1. How the building will be kept watertight as old roofing is removed and the work progresses.
2. How new roofing work will be coordinated with mechanical equipment work, replacement of deteriorated existing insulation and the installation of new insulation, cover board, flashings and other items to provide a watertight installation.
3. Generally accepted industry practice, the Manufacturer's instructions for handling and installing his products, and project specific work requirements.
4. The condition of the substrate (deck), curbs, penetrations and preparatory work needed by trades other than the roofer.
5. Submittals, if any remain incomplete.
6. The construction schedule, weather forecast for the work period, availability of materials, personnel, equipment and facilities needed to proceed and complete the work in an expeditious manner and on schedule.
7. A schedule for Manufacturer and Owner's Representative inspections.

1.9 JOB CONDITIONS (CAUTIONS & WARNINGS)

- A. Remove empty coating and solvent containers and contaminated rags from the roof and legally dispose of them daily.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material to the site in the Manufacturer's original and unopened packaging, bearing labels which identify the type and names of the products and Manufacturers, with the labels intact and legible.
- B. Store all materials in accordance to manufacturer's instructions.
- C. Immediately remove any insulation which gets wet from the job site.
- D. Do not overload the structure when storing materials on the roof.
- E. Store and install all material within the Manufacturer's recommended temperature range.

1.11 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Existing Roof System Under Warranty
 1. Portions of the existing roofing system is under warranty and the General Construction Contractor or their subcontractor must notify and be authorized by the manufacturer to perform all work as per the manufacturer's instruction.
 - a. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty.
 2. Comply with all warranty procedures required by manufacturer, including notifications
Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty, scheduling, and inspections:
 3. Manufacture's Warranty: Certification from manufacturer that the existing warranty covering membrane, roof insulation, and other indicated components of the system, shall remain the new and existing terms of the original warranty Contractors warranty.
 4. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.
- C. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.

PART 2 PRODUCTS

2.1 GENERAL

- A. Acceptable Manufacturer - Roofing System: Match existing manufacturers roofing system. Existing Roofing System is BASF Coatings.

1. Roofing systems by other manufacturers are not acceptable if existing roof is under warranty.
- B. Substitutions: See Section 01 2500 - Substitution Procedures

2.2 POLYURETHANE FOAM SYSTEM

- A. Two component system made by combining isocyanurate with polyol to generate a closed cell polyurethane foam with the following minimum characteristics:
 1. Density ASTM D-1622 2.7 lbs/ft³
 2. Compressive Strength ASTM SD-1621 45 psi
 3. Closed cell content ASTM D-2856 90%
 4. R-Value-aged ASTM C518 6.4 per inch
 5. Flammability ASTM E-84 75 max flame spread
 6. ASTM E-84 450
- B. Silicone Coating:
 1. Single component spray applied silicone coating designed for use as a weather seal over spray applied urethane foam roofing:
 - a. 78 to 82% solids by weight p
 - b. Minimum 100 degrees F flash point per Tag closed cup
 - c. Durometer hardness, Shore A, 32 points per ASTM D2240
 - d. 200 psi tensile strength per ASTM D412
 - e. 400% elongation per ASTM D570
 - f. .5% absorption per ASTM 526
- C. Sealant: A two component elastomeric urethane gun grade sealant, consisting of an activator and base, which will exhibit negligible shrinkage and 500 percent elongation manufactured by Sonneborn Building Products under the trade name Scholastic NP 2, or approved equal.
- D. V Groove Sealer: A high performance silicone seam sealer and dimensional stable polyester textile, Enduris 3500 Seam Sealant and Momentive RF 100 Reinforcing Fabric.
- E. Miscellaneous solvents, cleaners and accessories as recommended by the manufacturer of the primary materials.

2.3 BITUMINOUS MEMBRANE ROOFING

- A. Match existing.
- B. Base Sheet: ASTM D4601/D4601M Type I; asphalt-coated glass fiber; unperforated.
- C. Mineral Surface Cap Sheet: Asphalt-saturated organic roll roofing, ASTM D6380/D6380M, Class M, Type II, 2 inch (50 mm) selvage; white colored mineral granules.
- D. Roof Cement: ASTM D4586/D4586M, Type I, asbestos free.

2.4 ACCESSORY MATERIALS

- A. Equipment Rail Curbs: Straight curbs on each side of equipment, with top of curbs horizontal and level with each other for equipment mounting.
 1. Provide preservative treated wood nailers along top of rails.
 2. Height Above Roof Deck: 14 inches (356 mm), minimum.
 3. Material: Galvanized Steel, 14ga.
 4. Products:
 - a. MKT Metal Manufacturing; Equipment Rails: www.mktduct.com.
 - b. Thybar Manufacturing; TEM
- B. Aluminum Factory Fabricated Pipe Portals: Furnish and install the pipe portals:
 1. Provide number of pipes required. Coordinate with Mechanical contractor.
 2. Portal shall include an 0.080"(min.) aluminum housing and curbwithintegral base plate, continuously welded corner seams, powder coated finish, and 1.5" 3lb. rigid fiberglass insulation.

3. Portal shall be furnished with appropriate number and size of compression exit seals. Coordinate size and number with mechanical contractor.
4. All Caps shall include manufacturer's stainless steel snap-lock clamps.
5. Attachment and installation of the pipe portal shall be done in accordance with manufacturer's instructions and the roofing membrane manufacturer's recommendations.
6. Product:
 - a. Alta Products, LLC; Sigrist Pipe Chase Housing

PART 3 INSTALLATION

3.1 GENERAL

- A. Construct the new roofing system in a watertight, workmanlike manner, meeting the guarantee requirements specified herein; in strict accordance with the drawings and in conformance with the Manufacturer's requirements, except as enhanced in this specification.
- B. Clean the surface on which roofing system components will be applied, of all laitance, dirt, oil, grease or other foreign matter which would in any way affect the quality of the installation.
- C. Install roof system components on dry surfaces only. Do not install any items when weather conditions and outside temperatures are not suitable in accordance with the Manufacturer's recommendations.
- D. Complete all work in sequence as quickly as possible so that as small an area as practicable is in the process of construction at any one time. Complete the entire area of work begun each day, the same day, and make all exposed edges watertight at the end of each day's work.

3.2 SUBSTRATE INSPECTION

- A. Remove portions of existing roofing, insulation, and flashings, and carefully check the existing deck and new roof substrate. To be an acceptable surface for the new roofing system, the deck and substrate shall be well secured to the underlying structure, dry and not otherwise deteriorated.
- B. Immediately notify the Owner's Representative in writing if defects in the substrate are discovered.
- C. Maintain the building watertight in the interim, but do not install new insulation or roofing until substrate defects have been corrected.

3.3 NEW TO EXISTING INTERFACE

- A. Remove and replace portions of existing roofing at the construction interface between new construction and existing roof areas.

3.4 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.5 BITUMINOUS MEMBRANE APPLICATION

- A. Lay base sheet, coated side down. Lap sides 2 inches (50 mm); lap ends 6 inches (150 mm).
 1. Set in cold mastic at 2 gal/sq ft (97 L/sq m).
- B. Apply smooth, free from air pockets, wrinkles, fish-mouths, or tears.
- C. At intersections with vertical surfaces:
 1. Extend membrane and base sheet over cant strips and up a minimum of 4 inches (100 mm) onto vertical surfaces.
 2. Mop on base flashing of two additional plies of felt and one ply of base flashing material.

3.6 FOAM INSTALLATION

- A. Spray apply polyurethane chemicals to produce in place foam meeting the material properties specified in Part 2, in pass thicknesses of 1/2 inch to 1 inch, with a smooth surface texture to match the slope and thickness of adjacent remaining foam.
 - 1. Orange peel or rougher surface textures will not be accepted - the foam shall be removed and replaced.
- B. Allow adequate cooling time between multiple passes when foam thickness approaches 2-1/2 inches to prevent scorching, smoldering or combustion

3.7 FLASHING AND ACCESSORIES INSTALLATION

- A. Metal Accessories: Install metal equipment rails and pipe portals in locations indicated on the drawings.
 - 1. Follow roofing manufacturer's instructions.
 - 2. Remove protective plastic surface film immediately before installation.
 - 3. Install water block sealant under the membrane anchorage leg.
 - 4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
 - 5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.

3.8 FIELD QUALITY CONTROL

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).
- B. Perform all corrections necessary for issuance of warranty.

3.9 CLEANING

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.10 PROTECTION

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.
- B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- E. FM (AG) - FM Approval Guide; current edition.
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.
- G. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- H. UL (FRD) - Fire Resistance Directory; current edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Sustainable Design Submittal: Submit VOC content documentation for non-preformed materials.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Verification of minimum three years documented experience installing work of this type.

1.05 MOCK-UPS

- A. Install one firestopping assembly representative of each fire rating design required on project.
 - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
- B. If accepted, mock-up will represent minimum standard for this work.
- C. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
 - 2. Fire Rating: Minimum 1 hour for all corridor penetrations

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- D. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two samples, 1/2"x4" inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.07 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a three year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gunnable and Pourable Sealants:

2.02 SEALANTS

- A. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
 - 1. Color: Limestone.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.

- c. Joints between metal frames and other materials.
- d. Other exterior joints for which no other sealant is indicated.
- 3. Polyurethane Products:
 - a. Pecora Corporation; DynaTrol I-XL General Purpose One Part Polyurethane Sealant: www.pecora.com/#sle.
 - b. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Type 2 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
 - 3. Products:
 - a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com/#sle.
 - b. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com/#sle.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker where joint backing is not used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

3.06 SCHEDULE

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Type 1 .
- B. Control and Expansion Joints in Paving: Type 1.
- C. Control, Expansion, and Soft Joints in Masonry, and Between Masonry and Adjacent Work: Type 1.
- D. Joints Between Exterior Metal Frames and Adjacent Work (except masonry): Type 1.
- E. Interior Joints for Which No Other Sealant is Indicated: Type 2; .

END OF SECTION

**SECTION 22 0500
COMMON WORK RESULTS FOR PLUMBING**

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 general requirements that apply to the Plumbing and Plumbing Controls.
- B. The following work is specified under other Divisions, unless otherwise noted or specified hereinafter:
 - 1. Electrical Power, Division 26.
 - 2. Installation of starters, contractors, thermal overload switches and remote push buttons, Division 26.
 - 3. Mechanical Division 23

1.3 INTENT

- A. Requirements specified herein shall govern applicable portions of Plumbing whether so stated therein or not.
- B. It is the intent of this specification and accompanying drawings to describe and indicate the general manufacture, erection and installation of the equipment and connection to same specified herein and shown on the drawings. It is not intended that the specifications and drawings describe and indicate each piece of equipment required for installation, for where items are intended or required for satisfactory installation and are considered to be the accepted practice of the trade, they shall be considered to be both specified and indicated. Drawings are diagrammatic in nature; for piping systems; water piping is tapped off the bottom of the pipe and steam and steam condensate piping is tapped off the top of the pipe; provide all tees, elbows and swing joints as required for hookup to coils or branch piping as required for this work whether they are indicated on the drawings or not.
- C. It shall be understood that the Contractor as hereinafter mentioned shall be the Plumbing Contractor unless specifically noted otherwise.
- D. The Contractor shall furnish all plant, labor and material necessary for the complete and satisfactory installation of all Plumbing work for this contract.
- E. The Contractor shall assume the entire responsibility for the materials, workmanship and satisfactory operation of the various mechanical systems, and other work as specified herein and/or as shown on the drawings.
- F. The Contractor shall schedule and coordinate all work in close cooperation with all trades working on this project.
- G. All drawings and portions of the drawings, all floor plans, risers, details, schematics, and specifications indicated shall apply and are part of the plumbing contract.
- H. Any discrepancy or conflict noted between or within the above referenced documents shall be brought to the attention of the Architect/Engineer, in writing, a minimum of three (3) days prior to submittal of bids. The Architect/Engineer shall resolve issues prior to bid submittal.

- I. This Contractor shall carefully read the above-mentioned documents and study the drawings of all trades. He shall be responsible for neglect to read, or attend to, any paragraph or items contained therein. Failure to bring any conflicts or discrepancies to the attention of the Architect/Engineer, in writing, prior to bid submittal shall not constitute grounds for extras and/or change orders. Costs resultant from this failure shall be borne by this Contractor.

1.4 DEFINITIONS

- A. Following definition of terms and expressions used in this section are in addition to listing given in Supplementary Conditions:
 1. "Provide" shall mean "furnish and install" unless otherwise indicated.
 2. "Herein" shall mean the contents of a particular section where this term appears.
 3. "Indicated" shall mean "Indicated on contract drawings".
 4. 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, crawl spaces, and tunnels.
 5. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
 6. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
 7. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
 8. 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.
 9. The following are industry abbreviations for plastic materials:
 - a. ABS: Acrylonitrile-butadiene-styrene plastic
 - b. CPVC: Chlorinated polyvinyl chloride plastic
 - c. NP: Nylon plastic
 - d. PE: Polyethylene plastic
 - e. PVC: Polyvinyl chloride plastic
 10. The following are industry abbreviations for rubber materials:
 - a. CR: Chlorosulfonated polyethylene synthetic rubber
 - b. EPDM: Ethylene propylene diene terpolymer rubber
 11. .For additional abbreviations see the Abbreviations and Symbols Drawings.

1.5 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall be responsible for establishing grades and elevations, and checking of all interferences, and shall verify all dimensions and locations in the field.

- B. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, piping and approximate sizes and locations of equipment outlets. Mechanical trades shall follow these drawings in layout of their work, consult general construction, structural and electrical drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
- C. The Contractor shall verify with the A/E before bidding any item of piping or piping arrangement which may be incomplete, incorrect or indefinite. After contract is let, the A/E's decision shall be final.
- D. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such a manner that will in no way retard progress of construction. In instances where interferences develop, the contractor shall relocate the work as required by the A/E regardless of which work was installed first.
- E. Where job conditions require reasonable changes to indicated locations and arrangement, make such changes without extra cost to Owner. This is not to be construed to permit redesigning of the various systems.
- F. Additional and supplementary drawings may, from time to time, be furnished, and the same, when made, are to constitute a part of the original contract. These drawings will be made to clarify the contract drawings and will not depart materially therefrom.
- G. The A/E specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- H. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.
 - 1. Install all supply piping with adequate stops on each supply to all fixtures and or equipment to be connected to distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures and or equipment. Install stops in locations where they can be easily reached for operation.
- I. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture or equipment. Valves are specified in Divisions 22 and 23.

1.6 WORK INCLUDED

- A. These specifications, and accompanying drawings are intended to cover the furnishing by this Contractor of all labor, material and all equipment of every kind necessary for the complete installation of the various systems, and such other materials and equipment as hereinafter specified, and shall include, but not be limited to the following:
 - 1. Sanitary drainage and vent system within the building.
 - 2. Drainage specialties, including cleanouts, oil interceptor, floor & trench drains, etc.
 - 3. Domestic hot water recirculating system within the building as indicated.
 - 4. All piping, valves and fittings for the various systems.
 - 5. All expansion joints, loops, anchors and guides.
 - 6. Steel supports and hangers for all equipment and piping.
 - 7. Insulation for piping and equipment as herein specified.

8. All plumbing fixtures as hereinafter specified, including handicapped fixtures compliance with the handicapped code.
 9. All painting of pipe and equipment in the mechanical rooms and other unoccupied areas, and all painting of piping in no ceiling areas.
 10. Flush all water pipe and disinfect as specified.
 11. Setting of all sleeves and inserts in place.
 12. Testing, adjusting and placing in service all systems and equipment installed.
 13. Install all supply piping with adequate stops on each supply to all fixtures and or equipment to be connected to distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures and or equipment. Install stops in locations where they can be easily reached for operation.
 - a. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture or equipment. Valves are specified in Divisions 22 and 23.
 14. Domestic hot water system including valves, supply valves, supply piping, and return piping to fixtures and equipment requiring hot water as indicated.
 15. Complete propane gas piping system from the gas meter/regulator set to all fixtures and equipment within the building requiring gas. Terminate at heating equipment or water heating equipment with gas cock.
 16. Water supply specialties including shock absorbing devices, backflow preventers, wall hydrants, thermometers, etc.
 17. All excavation and backfilling required for the above work.
 18. All necessary valves, gas cocks and shutoffs.
 19. All plumbing fixtures, drains, floor drains, equipment, piping, fittings, valves, etc. shall be commercial for schools.
- B. The above is presented for general guidance only and does not necessarily cover the entire requirement of the project as shown on the drawings and/or as specified hereinafter.

1.7 SCHEDULE OF WORK

- A. The Contractor shall schedule all of his work to conform to the Job Progress Schedule as submitted by the General Contractor or Construction Manager, and approved by the A/E.

1.8 RELATED WORK SPECIFIED ELSEWHERE

- A. The following related work items are included in separate Divisions as follow:
1. General Requirements – Division 01
 2. Roofing, thermal and Moisture Protection – Division 07
 3. Painting – Division 09
 4. HVAC – Division 23
 5. Electrical – Division 26

- B. The following items of work related to plumbing will be performed by others as follows:
1. The General Contractor shall paint all piping in finished areas, provide all base flashing on roof, and build in all sleeves, unless otherwise noted.
 2. The Electrical Contractor shall do all power wiring for plumbing equipment unless otherwise noted.
 3. The General Contractor shall install all access panels furnished by the Plumbing Contractor.
 4. The HVAC Contractor shall provide drainage piping from his equipment to drains provided by the Plumbing Contractor.

1.9 WORK AS A SUBCONTRACTOR

- A. When the plumbing work is subcontracted, the exact scope of work may be limited or added to at the discretion of the General Contractor. A subcontractor shall, therefore, verify the extent of his work with the General Contractor.

1.10 INTERFERENCE WITH THE OWNER'S NORMAL OPERATION

- A. All work shall be performed in such a manner as not to interfere with the normal work operations in adjacent spaces or buildings.
- B. In no way shall the Contractor:
1. Block or restrict the means of egress for adjacent spaces.
 2. Decrease the fire rating of walls, partitions, ceilings, doors or combination thereof of adjacent spaces or of means of egress.
 3. Interrupt safety systems or in any way adversely affect the safety of people or materials in adjacent spaces.
- C. The Contractor shall provide acoustical isolation of the work area via temporary doors, partitions, etc., adequate to allow normal work functions.
- D. The Contractor shall provide exhaust fans, dust proof temporary partitions and any containment measure required to prevent dirt, dust, or fumes from reaching adjacent work spaces.
- E. All personal traffic and material delivery shall be routed so as to absolutely minimize travel through adjacent work area.

1.11 VISIT TO SITE

- A. The Contractor shall visit the site and thoroughly acquaint himself with all existing conditions relative to type and source of service available. He shall verify location and extent of these services and consider routing, interferences and excavation required by the contract and any and all other difficulties that may be encountered.
- B. Submission of a proposal shall be construed as evidence that such an examination has been made.
- C. Failure to visit the site shall not constitute sufficient reason to warrant claims for extra monies for difficulties not apparent in the contract documents.

1.12 MANNING THE PROJECT

A. The Contractor shall, upon initiation of construction, keep a suitable force of men on the site at all times in order to lace all sleeves, inserts, outlet boxes, fixtures and provide all other openings as are required for the satisfactory installation of equipment.

1.13 FEES AND PERMITS

- A. The Contractor shall secure all permits and pay all fees, required by local and state governing bodies, necessary to complete his phase of the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional monies from the Owner. The Owner shall be furnished with all certificates of approval.
- B. The Contractor shall provide insurance and bonding as required by the Building Owner or as stated in the General Conditions.

1.14 CODES AND STANDARDS

- A. The design, construction and installation of all materials and equipment shall be in compliance with the latest edition of all national, state and local codes or standards.
- B. The codes and standards referred to are minimum standards. Where the requirements of these specifications and the accompanying drawings exceed those of the codes and standards, the drawings and specifications shall be followed.

1.15 BASIS OF DESIGN

- A. The layout is based upon the use of particular items of equipment, identified by manufacturer's make and model number. Dimensions, arrangements and service connections required for these particular items have been considered in making the layout. The contractor may use the equipment of any manufacturer whose name is approved for substitution on that item of equipment after he had ascertained that all provisions of MATERIAL SUBSTITUTIONS will be complied with and that all required service connections will be made at no additional cost to the Owner.
- B. Except where dimensions are shown, the drawings are diagrammatic and shall not be scaled. Exact location of fixtures, apparatus, duct work and piping shall be determined by dimensions on the site. Contractor shall refer to architectural plans and details for exact dimensions.
- C. The drawings indicate the locations of apparatus, fixtures, and piping shall be followed as closely as possible. If before the installation it is found necessary to change the location to accommodate conditions at the building, such changes shall be made at no additional cost to the Owner, and as approved by the Architect/Engineer.
- D. Equipment requiring operation, service or maintenance during the life of the system shall be made easily accessible.
- E. Piping shall not be run within 48" of switchboards, panelboards or motor control centers.
- F. Use of open-flame devices in work shall be accompanied by fire extinguishing apparatus within 25 feet of work location. Provide Fire Watch review of the work during each shift.

1.16 QUALITY OF MATERIALS

- A. Where a specific model and manufacturer of equipment is specified, the Contractor shall provide what is specified without substitution. Where specified as "or approved equal", the Contractor may substitute equipment except that the burden is upon the Bidder to prove such equality. If the Bidder elects to prove such equality, he must request the Architect's approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty and cost.
- B. Where a specific model of equipment is specified along with an approval equal manufacturer, no substitution will be allowed. The Contractor shall submit one of the manufacturers listed.
- C. Final approval of competitive equipment is reserved by the Engineer when, in the Engineer's opinion, the equipment does not correspond to that specified.

1.17 MATERIAL SUBSTITUTIONS

- A. Material substitutions shall be allowed only where "or equal" is stated.
- B. Material substitution submittals shall, include complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance, test data and evidence that the proposed manufacturer or his established representative maintains a qualified service organization including spare parts and is available for competent service on short notice.
- C. Each bidder by submitting his bid represents that the proposal of such article, device, product, material, fixture, form or type of construction by name, make, catalog number of manufacturer which varies with the equipment specified shall be incorporated into the project without claims against the Owner for additional cost. The bidder shall be responsible for all additional costs incurred by others due to the substitutions.
- D. The Architect/Engineer shall have the final approval of all submitted substitutions.

1.18 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall bear a stamp or notation indicating that the Contractor has reviewed and approved the submittals.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- D. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- E. Submit each section separately and include the following:

1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Submittals on all pumps shall be complete with performance curves marked with the design points.
 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
 4. Vibration isolators shall include operating weight and load distribution at each mounting point.
- F. The Contractor agrees that failure of manufacturer's submittal to conform to the above will result in a manufacturer's disqualification on this project.
- G. Submit samples as directed of items called for in the specifications; samples of the materials which the manufacturer will actually ship shall be submitted for approval after award of contract and properly labeled on this project.

1.19 PRODUCT HANDLING

- A. Following is in addition to Protection of Work and Property, General Requirements:
1. Responsibility for care and protection of mechanical work rests with the Contractor until it has been tested and accepted.
 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage from all causes.
 3. Protective covers, skids, plugs, caps and coating shall be provided to protect equipment materials from damage during construction.
 4. All equipment and material shall be stored under cover and off the ground.
 5. For outdoor storage, protective covers of sheet plastic shall be provided. Covers shall be of gauge required for the area involved and shall be reinforced to withstand wind, rain, sleet and snow. Equipment and material shall be set on skids or platforms of sufficient height to avoid deterioration from spattering and ground water.
 6. Plug open ends of pipes when work is stopped to prevent debris from entering the pipes.
 7. Protect plumbing fixtures and other equipment with enamel or glazed surface, from damage by covering and/or coating, as recommended in Bulletin "Handling and Care of Enameled Cast Iron Plumbing Fixtures," issued by Plumbing Fixture Manufacturers' Association.
 8. Coat polished or plated metal parts with Vaseline immediately after installation.
- B. The Contractor shall receive, properly house, handle, hoist, and deliver to proper location, equipment and other materials required for the contract.
- C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

1.20 COORDINATION DRAWINGS

- A. Detailed layout shop drawings on all systems as required in Division 01 – Project Coordination, Division 22, 23, and 26, must be coordinated with field erection drawings for Architectural, HVAC, Plumbing, Fire Protection, and Electrical Systems by the respective contractors.
- B. Prepare coordination drawings for all areas by building, floor area and/or phase, of the project. Close attention should be implemented where limited space availability necessitates maximum utilization of space for efficient installation of different components.
- C. Mechanical, Electrical and Plumbing Prime Contractors are responsible to prepare coordination drawings to a Scale of $\frac{1}{4}'' = 1'-0''$ or larger; detailing major elements, components, and systems of mechanical and electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including but not limited to the following:
 - 1. Proposed locations of ductwork, piping, conduit, equipment, and materials.
 - 2. Clearances for installing and maintaining insulation.
 - 3. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - 4. Equipment connection and support details.
 - 5. Exterior wall and foundation penetrations.
 - 6. Fire rated wall, floor, ceiling, and roof penetrations.
 - 7. Sizes and location of required concrete pads and bases.
 - 8. Valve stem movement.
 - 9. Sleeves.
- D. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations. Clearly define relationships between sleeves, piping, ductwork, conduit, ceiling grid, lighting, fire sprinkler, HVAC equipment and other mechanical, plumbing, and electrical equipment with other components of the building such as beams, columns, ceilings, and walls.
- E. Prepare reflected ceiling plans to coordinate and integrate installations of air outlets and inlets, light fixtures, communication systems components, sprinkler, and other ceiling mounted items.
- F. Resolve conflicts between trades, prepare composite coordination drawings and obtain signatures from all affected Prime Contractors on original composite drawings. Submit coordination drawings to the Architect/Engineer and Construction Manager for approval.
- G. Mechanical, Electrical and Plumbing Prime Contractors are to first submit their respective shop drawings for approval, to the Architect/Engineer, in order to make any necessary changes prior to going through the coordination process.

- H. Coordination drawings to be signed off by affected Contractors within 45 days of Notice to Proceed. A Coordination drawing timeline schedule shall be developed and tracked.
- I. The coordination drawings shall be coordinated with the construction and phasing schedule.
- J. The routing process will begin with the HVAC Contractor who shall take the lead in the coordination of their work with all affected trades.
- K. The HVAC Contractor shall prepare CAD drawings to be used as the basis for coordination drawings in all areas or as determined by the Construction Manager (Scale: ¼" = 1'-0" or larger). These drawings shall be completed in digital format. All architectural features shall be accounted for in preparation of this drawing; i.e., permanent, casework, interior columns, partitions, finish ceiling and height, lighting and roof elevations, etc. The HVAC Contractor will provide CAD files and drawings showing all of the approved ductwork. HVAC Contractor is to locate all piping with orange lines. Forward drawings to the Plumbing Contractor.
- L. The Plumbing Contractor is to locate the plumbing lines with blue lines and sprinkler lines and head locations with red lines, and resolve all conflicts and determine locations and elevations, and forward drawing to the Electrical Contractor.
- M. The Electrical Contractor to indicate all lighting fixtures, panels with associated clearances, duct banks, bus duct, conduit racks and all individual conduits 1 ½" and larger in with green lines, and resolve all conflicts and determine locations and elevations and forward to the General Construction Contractor. The General Construction Contractor will have the last coordination review. Provide overlaid coordination drawings for all General Construction work and resolve all conflicts. All architectural features shall be detailed clearly, i.e. permanent casework, interior columns, partitions, finish ceiling and roof elevations, etc. Provide a ceiling layout detailed coordination drawing showing ceilings, lights, diffusers, etc.
- N. Contractors to provide underground coordination drawings for all underground utilities; show exact location of piping stub ups, floor drains, etc. as required.
- O. Prime Contractors shall be responsible for all costs associated with creating CAD files.
- P. All coordination meetings will be held in the Construction Manager's field office or as required by the Architect/Engineer. As each coordination drawing is completed, Contractors are to meet with the Construction Manager to review and resolve all conflicts on the coordination drawings. Contractors are required to distribute shop drawings, cut sheets and submittals to other Prime Contractors where appropriate. Approved coordination drawings will also be available for reviewing at the Construction Managers field office.
- Q. All Contractors shall provide a hard copy of the coordination drawings for review by the Architect/Engineer.
- R. Once complete and signed off, the HVAC, Plumbing and Electrical Contractors will submit dimensioned wall and slab penetration drawings and housekeeping pad drawings to the appropriate parties.
- S. If the coordination drawing process is not complete, Mechanical, Electrical and Plumbing Contractors will provide wall penetration drawings to the General Construction Contractor no later than five (5) days prior to wall erection.
- T. All Prime Contractors must install the work in accordance with the coordinated drawings at no additional cost to the Owner. No additional compensation will be made for extra ductwork offsets, piping and/or conduit or retrofit work due to improper component location, or lack of Contractor(s) coordination.

- U. All Prime Contractors shall take special care in verifying with the Electrical Contractor that the equipment matches the characteristics of the power being supplied. The Electrical Contractor is similarly bound.
- V. The Mechanical, Electrical and Plumbing Drawings are schematic in nature and are not intended to show every offset and detail. The Mechanical, Electrical and Plumbing Contractors will make adequate provisions in their bid to accommodate the actual conditions, provide all required ductwork, piping and conduit offsets per the coordination drawings, without additional cost to the Owner.
- W. The Mechanical, Electrical and Plumbing Contractors shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop drawings should also highlight these areas for Architect/Engineer's review. In addition, the Contractors shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical/electrical systems requiring that access.
- X. Specific Requirements – Required Information to be provided on Coordination Drawings:
 - 1. General Construction/Structural Work Information including but not limited to:
 - a. Openings and sleeve locations required in slabs, walls, beams, and other structural elements, including required openings not indicated on the Contract Documents.
 - b. Slab edge locations
 - c. Embed locations, as described above. Note embedded steel angles at edges of sump and sewage ejector pits, to accept basin covers.
 - d. Wall and chase spaces for housing HVAC, Plumbing, or Electrical items.
 - e. Access doors in coordination with the respective contractor systems.
 - f. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
 - 2. HVAC Work Information including but not limited to:
 - a. Sizes and bottom elevations of rectangular ductwork, including angle bracing, flanges, and support systems.
 - b. Sizes and centerline elevations of round ductwork, piping and conduit runs
 - c. Acoustical lining in ductwork.
 - d. Identification of ductwork pressure class.
 - e. Dimensions of major components, such as dampers, valves, diffusers, registers, cleanouts, coils, VAV boxes, HVAC equipment, and electrical distribution equipment.
 - f. Fire-rated enclosures around ductwork.
 - g. Access panels required.

- h. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination
- 3. Plumbing and Fire Protection Information including, but not limited to:
 - a. Sizes and centerline elevations of piping runs.
 - b. Locations of plumbing valves, equipment, and fixtures.
 - c. Locations of standpipes, floor control assemblies, fire hose valves, mains, piping, branch lines, pipe drops, sprinkler heads, fire pumps/controllers, and jockey pumps.
 - d. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
- 4. Electrical Work Information including, but not limited to:
 - a. Runs of vertical and horizontal conduit, 1 ¼" diameter and larger
 - b. Light fixture locations
 - c. Exit light locations
 - d. Smoke detector and other fire alarm locations
 - e. Panelboards, switchboards, switchgear, transformers, busways, generators and motor control center, exit signs, and emergency battery pack locations.
 - f. Locations of pull boxes and junction boxes, dimensioned from column centerlines
 - g. Access panels required.
 - h. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
- 5. Ceiling Systems and Plenum Space Information including, but not limited to:
 - a. For HVAC, Plumbing, Fire Protection, Fire Alarm, Electrical, Controls and Telecommunications Work penetrating acoustical ceilings, show locations of each item (including sprinkler heads, diffusers, grilles, access doors, light fixtures, smoke detectors exit signs, speakers, and other visible ceiling mounted devices) relative to the acoustical ceiling grid.
 - b. Locate components within ceiling plenums to accommodate layout of light fixtures indicated on Drawings. Clearly indicate areas of conflict between light fixtures and other components on Coordination drawings.
 - c. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.

- Y. The Sheet Metal Contractor shall prepare his work on reproducible and submit 1/4" scale CAD drawings of the sheet metal duct field erection shop drawings for the coordination procedures, and each Contractor will supply the necessary qualified personnel for these procedures which will be conducted by the General Contractor. The HVAC, Plumbing and Fire Suppression work to the drawings where conflicts are noted and achieve solutions to any conflicts that may exist.
- Z. The General Contractor will be required to signify his acceptance of the results of the coordination procedures by signing and dating the master coordination print.
- AA. Each Contractor will be required to correct his field erection drawing(s) used as a basis for the coordination procedures to complement the results of the procedures prior to submitting same for approval. No field erection shop drawings will be accepted for approval without having been coordinated.
- BB. As part of the coordination procedures, applicable "Approval" or "Approved as Noted" copies of other trades' shop drawings will be transmitted to the Contractor. It will be each Contractor's responsibility to check these shop drawings to ascertain what effect, if any, these shop drawings have on that portion of the work under his direct responsibility. Each contractor will advise the General Contractor within forty-eight (48) hours of receipt of the shop drawings, in writing, indicating receipt of same and whether or not they have any effect on the work of his contract.

1.21 ELECTRICAL

A. Power Wiring

- 1. For the purpose of this specification, power wiring shall be defined as follows:
 - a. All wiring from the power source panelboards (or switchboard) to the disconnect switch to the equipment, and final connection to the equipment.
 - b. All wiring to control panels as indicated in the Electrical and Plumbing Contract Documents. (All control panels not indicated on the Electrical Contract Documents as receiving power shall do so by jumpers from other control panels, this wiring shall be considered control wiring as defined below).
- 2. All power wiring from the power source to the above noted switches and wiring from these switches to the equipment, including final connection to same, shall be provided under Division 26, Electrical.

B. Control Wiring

- 1. All other wiring required, whether line voltage or low voltage, internal or external to provide for the operation of the equipment shall be considered as control wiring.
- 2. All control wiring throughout the building, including wiring installed at piping, or as specified shall be provided under this Division 23.

- C. The Contractor shall furnish all motors, mounts, motor starters and remote mounted push-button controls for all electrically operated equipment furnished as part of the contract. The Contractor shall furnish all safety disconnects where described hereinafter. The Contractor shall furnish all speed control switches for all multi-speed motors. All motors shall have copper windings. (Aluminum windings will not be acceptable).

- D. This Contractor is completely responsible for the coordination with all other trades as to the correct voltage for all equipment requiring power. Equipment and or changes required to meet the project voltages will be the responsibility of this contractor.
- E. All push-button switches and starters shall be mounted under Division 26, Electrical.
- F. The Contractor shall provide all controls and control devices, all mounting for controls and all other electrical devices as specified and necessary for the complete installation and satisfactory operation of all electrically operated controls furnished under this Division.
- G. All locally mounted starters shall be furnished under Division 22, except as noted below. Where indicated hereinafter, starters shall be furnished as an integral part of equipment. Starters furnished in motor control centers shall be provided in Division 26, Electrical (refer to Electrical Drawings). Control of starters in motor control centers feeding plumbing equipment shall be provided under Division 23.
- H. Starting equipment of each motor shall be of the proper voltage and HP rated for the motor it is to serve. All starters shall be of the enclosed type; NEMA Type 1, for general-purpose enclosures; NEMA Type 4 for watertight enclosures, and NEMA Type 12 for the dust-tight enclosures. Location of motor shall determine type of enclosure to be used.
- I. Manual motor starters for single-phase motors shall be one or two poles as required, consisting of a snap switch combined with a thermal overload device. It shall be impossible for the switch to be held in a closed position under a sustained motor overload. For resetting the overload mechanism, the switch lever shall be of a design where it has to be moved to the "off" position. Starter shall be enclosed in type of enclosure for area in which it is to be used.
- J. Magnetic starters for 3-phase motors shall be furnished with 110 volt holding coils, 120-volt fused transformers, normally open and normally closed auxiliary contact and overload relay heater elements in all three phases. Provide hand/off/auto selector switch along with running status lights and external reset button.
- K. Locate starters and associated starter controls in accessible locations wherever possible. Location of starters for roof mounted equipment above ceilings shall be located at accessible locations above ceiling. Locations shall be coordinated with furniture and equipment layouts for the optimum accessible location for installation and maintenance means
- L. The Contractor shall be completely responsible for the coordination control system with control interlocks between various items of plumbing equipment.

1.22 SCAFFOLDING

- A. The Contractor shall furnish and install scaffolding, ladders and runways required in connection with his work.

1.23 TEMPORARY OPENINGS

- A. Temporary openings not indicated, which may be required for purpose of bringing equipment into building, shall be as approved. General Contractor will perform work of providing and maintaining openings, and of restoring structure; but Contractor for whom temporary openings are provided shall bear costs thereof, and for restoring structure. Ample notice shall be given of size and location of such openings by Contractor requiring same.
- B. Holes provided in General Construction work to permit installation of lines for temporary services will, after removal of such lines, be patched as specified under Division 01.

1.24 TEMPORARY SERVICE

- A. Temporary services are specified under Division 01, "General Requirements".

1.25 EXCAVATION

- A. All excavation is unclassified. The Contractor shall inspect the site and make allowance in his bid for soil to be excavated since no compensation will be given where rock is encountered.
- B. The Contractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kind necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate sections of these specifications. Trenches for piping are to be excavated to a minimum width of one (1) foot plus the outside diameter of the pipe. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade in the direction of flow. Trenches shall be deep enough to provide a minimum of four (4) feet fill over the piping except as may be otherwise indicated on the drawings.
- D. In each excavation, trenches shall be carried to six inches below invert of pipe. Pipe shall be surrounded in all directions by a six-inch layer of selected crushed stone or gravel. If rock is encountered, carry trench to a point six inches below pipe invert. No pipe shall be bedded directly upon rock but shall be cushioned by a six-inch layer of selected crushed stone or gravel.
- E. The Contractor shall do any shoring, bracing, etc., necessary to maintain the banks of his excavation, shall make good and damage done to property of adjoining premises or work of other contractors due to his failure to properly shore his excavation. The Contractor shall do all pumping required to keep his excavations free of water including rental of pumps, temporary power and labor.
- F. All excavations shall be left open until work has been inspected and approved by the Architect. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all examinations and tests. Under no circumstances shall excavated material be left even temporarily, where it will interfere with the building or other Contractor's operations.
- G. Excavations which pass under or within eighteen (18) inches of columns or wall foundations shall be backfilled up to the level of columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.
- H. All earth backfilling shall be made in layers not to exceed eight (8) inches and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The Contractor shall distribute on the premises as directed, all earth remaining after the backfilling.
- I. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored in the project properly. All contractors shall be notified prior to any blasting.

- J. Explosives used shall be subject to approval of the Architect. The blasting shall be properly covered with blasting mats.
- K. Any rock encountered within five (5) feet of pipes of building walls shall be removed without blasting. Any blasting required shall be performed at such times as to meet reasonable request of the Architect.
- L. The Contractor will do all patching of bituminous surfaces, concrete walks, driveways, streets, etc., necessary to complete his work. All patching shall match the existing surfaces. Painting shall be done by personnel skilled in their trades.
- M. Provide adequate temporary crossovers for pedestrian and vehicular traffic including guard rails, lamps, flags, as directed; remove same when necessity for such protection ceases.

1.26 CUTTING AND PATCHING

- A. The Contractor shall provide all floor and wall cuts as required for piping penetrations of existing construction.
- B. No cutting of bearing walls, beams, etc., shall be done without the approval of the Architect. All patching and finishing, etc., shall match the surroundings. All cutting and patching shall be done by workmen skilled in the trades and in the employ of the General Contractor for the project. All cutting shall be done with saw type edges to give a neat and workmanlike appearance. All pipe holes shall be core drilled unless specified otherwise.
- C. Should it be necessary to do any cutting and patching due to the failure of this Contractor to give proper information to the General Contractor, it shall be done at the expense of the Plumbing Contractor.

1.27 PAINTING AND FINISHING

- A. Except as specified herein, the finished painting of Plumbing Work within the building and on the roof shall be as specified under Division 09.
- B. All mechanical equipment shall have a factory-applied prime and finish coat of paint. Galvanized surfaces shall be considered as finished surfaces for equipment rooms and items concealed from view. Plastic products shall be acceptable without a finish coat of paint. All items of equipment marred or rusted, even though factory finished, shall be repainted; steel angles and steel supports for ductwork, piping or miscellaneous equipment shall have a prime coat of paint before installation.
- C. Paint all exposed piping, equipment, and trim that does not have a factory applied finish. Refer to Division 09 "Painting" for paint materials, surface preparation and application of paint. Paint shall be semi-gloss, acrylic-enamel paint. Coat components with two (2) coats of finish paint over two (2) coats of rust inhibitive metal primer or approved equivalent based on component type.

1.28 CONCRETE WORK

- A. Concrete work shall be in accordance with Division 03.
- B. Provide 4" high concrete pads for floor mounted plumbing equipment as indicated on drawings.

1.29 SUSPENSION SUPPORT FOR EQUIPMENT

- A. All pipes and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points, supplementary steel members shall be added by the Contractor as required to adequately support the load.
- B. Pipes and ducts shall not be supported from other pipes, ducts, or equipment.
- C. Hangers from joists shall be attached at the panel points. Pipes and ducts with weights of 50 pound per foot (total for single or multiple runs) routed parallel with bar joists shall be supported from a minimum of 3 joists at each hanger point (channel members between joists).

1.30 ACCESS PANELS – BUILDING

- A. Valves and equipment located concealed in walls or above ceilings, and are otherwise inaccessible shall be furnished with an access panel for each location. A hinged inconspicuous type access panel complete with frame, of such size and so located as to provide proper access for service and maintenance.
- B. The minimum size of each access panel shall be 18" x 18" unless physical restraints require a smaller door.
- C. Where such equipment is located above removable concealed spline push up type acoustical tile or metal pan ceilings, it shall be considered as accessible if the acoustical material is arranged for access to the space above the ceilings.
- D. Access panels shall be Milcor "DW", or equal, for drywall locations and Milcor "K", or equal, elsewhere.
- E. Panels and frames shall be prime painted.
- F. Panels shall be furnished under this Division and installed under another Division of this Specification.
- G. Panel material shall be steel except that construction shall be all aluminum in bathroom applications.
- H. When access panels or doors are installed in fire rated construction, they shall be fire rated to match the construction.

1.31 FIRESTOP PENETRATION PROTECTION SEALING SYSTEM

- A. Where pipes pass through fire partitions, firewalls, floors or ceilings, install a firestop that provides an effective barrier against the spread of fire, smoke, gases and water. Fire-stop material shall be packed tight, and completely fill clearances between pipe, sleeves and structure. All crack voids or holes (up to 4" diameter) shall be sealed using 3M brand Fire Barrier Caulk CP25 or putty 303 or an approved equal. Larger diameter or square holes, 3M system 7902, 7904, 7902R or 7904R or approved equal shall be in accordance with manufacturer's instructions.

- B. Fire-stopping material shall maintain its integrity while preventing the passage of flame, smoke, gases or water. Fire-stopping material shall be a one-part, intumescent elastomer noncombustible, noncorrosive and compatible with synthetic cable jackets as defined by ASTM E814 (UL 1479); and in addition for insulation materials, melting points shall be a minimum of 1700 degrees F for one-hour protection and 1850 degrees F for 2-hour protection.

1.32 RECORD DRAWINGS

- A. The Contractor shall furnish record as-built drawings to the Architect at completion and acceptance of the job. Transparencies of the original drawings with corrections shall be submitted as specified in the General Requirements.
- B. Record all changes from installation originally indicated. Record final location of underground lines by depth from finished grade and by offset distances in feet and tenths to surface improvement such as buildings, curb, or edges of walks. Where work appears on two or more drawings, Contractor shall mark changes on all drawings. Contractor shall mark changes on all drawings. At completion, furnish the above required transparencies to the A/E for approval and record. Drawings shall be certified to be record of work installed and signed by the Contractor. Work shall not be accepted until such drawings have been delivered to the A/E.

1.33 GUARANTEE

- A. In addition to the requirements stated in the specifications, the Contractor must guarantee all equipment, materials, and appurtenances installed by him to be free from all defects for a period of one year from date of final acceptance.
- B. Upon written notice from the A/E, the Contractor shall promptly correct all defects without additional cost to the Owner. This Contractor shall adjust each part of the entire installation for proper working order. Reports are to be submitted to the A/E and adjustments repeated until the entire system is satisfactory. This Contractor must make good, at his own expense, any defects in materials or workmanship that may appear.

1.34 CLEAN UP

- A. The Contractor shall be held responsible for the general clean-up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.
- B. All stickers, rust, stains, labels and temporary covers shall be removed before final acceptance.
- C. Foreign matter shall be blown, vacuumed or flushed out of piping, pumps, fans, motors, devices, switches, panels, and equipment.
- D. Identification plates on equipment shall be free of excess paint and shall be polished.

1.35 OPERATION AND MAINTENANCE MANUALS

- A. Submit to the Engineer for approval three manuals covering details of operation maintenance for all apparatus requiring service. The Contractor shall arrange formal instruction sessions by competent representatives of the manufacturer for the Owner's operating personnel to cover the following:
 - 1. Plumbing Fixtures (all)

2. Service telephone number, fax number, websites, email addresses, business and service addresses and mobile telephone numbers of the installing contractor, and manufacturer and supplier and parts counters of pumps, water heaters, backflow preventers, and other components comprising the systems.
 3. Manufacturer's operating and maintenance manuals, including detailed parts lists with numbers, power and wiring diagrams for each piece of equipment and accessory requiring services or maintenance, the guarantee period and the name, address and phone number of the nearest sales and service organization for each item. Both on print and CD's (min 3 copies) form (PDF/MS Word).
 4. Cross out options that are not used on equipment sheets, highlight options selected.
 5. Step-by-step procedure for starting, stopping, setpoint adjustment, monitoring and alarm enunciation for each system.
 6. Copies of inspection certificates provided by the City, County, State and insurance companies.
 7. Routine maintenance procedures for all plumbing equipment.
- B. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of the manuals.

1.36 INSTRUCTION TO OPERATIONAL PERSONNEL

- A. Plumbing Fixtures (all)
- B. Furnish the services of competent instructors to give full instruction to the designated Facilities personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system on the Contract Documents. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work.
- C. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. Provide 8 man-hours each of instruction for, pumps, water heaters, compressors, air dryers, vacuum pumps, and other equipment required by the Owner's personnel.
- D. Instruction shall cover routine maintenance, wiring and power wiring diagrams and component analysis, preventative maintenance and scheduling, starting and stopping, alarm resets, trend-logging, setpoint adjustment, emergency and normal shutdown/startup, relative pressure control system for the morgue, alarm date stamping and all else required by the Owner for complete usage/maintenance/adjustment of equipment in their intended systems.
- E. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of instructions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Materials and equipment shall be in accordance with the specifications as outlined in each specification section describing plumbing components, fixture valves, piping, etc.
- B. All components shall be according to ASTM, ANSI, CISPI, NFPA and Code standards.
- C. Electrical equipment shall bear the underwriter label.

3.2 SITE INSPECTION

- A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.3 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specification to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule
2. Preparation of the Schedule of Values
3. Installation and removal of temporary facilities and controls
4. Delivery and processing of submittals
5. Progress meetings
6. Pre-installation conferences
7. Project closeout activities
8. Startup and adjustment of systems
9. Project closeout activities

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into the work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequenced.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Number of Copies: Submit three opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned. Markup and retain one returned copy as a Project Record Drawing.
3. Refer to individual Sections for Coordination Drawing requirements for work in those Sections.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

3.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

3.6 PROJECT MEETINGS

- A. General: Attend meetings and conferences at Project Site, unless otherwise indicated.
 1. Agenda: Be prepared for the meeting agenda. Distribute the agenda to all invited attendees.
 2. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Attend a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule
 - b. Phasing
 - c. Critical work sequencing and long-lead items
 - d. Procedures for processing field decisions and Change Orders
 - e. Procedures for requests for interpretations (RFIs)
 - f. Procedures for testing and inspecting
 - g. Procedures for processing Applications for Payment
 - h. Submittal procedures
 - i. Preparation of Record Documents
 - j. Use of the premises and existing building
 - k. Work restrictions
 - l. Owner's occupancy requirements
 - m. Responsibility for temporary facilities and controls
 - n. Construction waste management and recycling
 - o. Parking availability
 - p. Office, work, and storage areas
 - q. Equipment deliveries and priorities
 - r. First aid
 - s. Security
 - t. Progress cleaning
 - u. Working hours
 3. Minutes: Record and distribute meeting minutes.
- C. Pre-installation Conferences: Attend a pre-installation conference at Project Site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction Manager of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents
 - b. Deliveries
 - c. Review of mockups
 - d. Possible conflicts
 - e. Time schedules
 - f. Manufacturer's written recommendations
 - g. Acceptability of substrates
 - h. Temporary facilities and controls
 - i. Coordination with other work
 - j. Protection of construction and personnel
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Attend progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:

- 1) Interface requirements
 - 2) Status of submittals
 - 3) Off-site fabrication
 - 4) Site utilization
 - 5) Hazards and risks
 - 6) Progress cleaning
 - 7) Status of correction of deficient items
 - 8) Requests for interpretations (RFIs)
 - 9) Status of proposal requests
 - 10) Pending changes
 - 11) Status of Change Orders
 - 12) Pending claims and disputes
 - 13) Documentation of information for payment requests
3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Equipment locations: All plumbing equipment shall be located to provide for manufacturer's recommended clearances, clearance for routine maintenance, clearance per code requirements and locations/clearances required for removal/replacement in the future.
1. Manufacturer's recommended clearances shall include space for proper airflow and non-short circuiting airflow pathway (plumbing equipment, etc), clearance for pumps (18" minimum around pumps), 30" clearance or complete access door swings clearances for tube pulls (heat exchangers, coil pulls, etc); locate piping to be clear of these locations.
 2. Provide minimum 36" clearance around water heaters, heat exchangers and other pressure vessels; note this is a minimum requirement, provide excess wherever possible. Provide minimum 48" clearance from power panels per the latest edition NEC having jurisdiction; include requirements for piping and ductwork at such locations.
 3. Locate equipment in mechanical rooms to allow for future removal and replacement. Include heights to overhead piping where applicable. Wherever possible, clearances shall include removal/replacement as a whole entity without knock-down.
 4. Access platforms with metal grating shall be provided for equipment located outdoors such for power and control panels for equipment located on dunnage. This access system shall provide for maintenance and requirements per codes having jurisdiction. Platforms shall include stairs and handrails per OSHA regulations.
 5. Locate roof mounted equipment minimum 10' away from edges of roof. Where equipment is located closer, provide handrail system at roof edge as required per codes having jurisdiction. Maintain clearances from handrail system to power panels.
 6. Locate air intakes 25' away from exhaust outlets and plumbing vents for healthcare facilities.

7. Locate air intakes for kitchen air intakes min 10' away from exhaust outlets and plumbing vents from kitchen exhaust fans.

3.7 CONNECTION TO EXISTING UTILITIES

- A. If connecting to an existing piping system (water, gas, oil, sewer, steam, condensate, etc.). It shall be the responsibility of this contractor to verify the integrity of the piping system being connected. Coordinate all system shutdowns with the owner. All applicable testing and acceptance will apply.
- B. Existing Pipe Testing: The contractor shall remove a section of piping at the point of connection between new and existing. The contractor shall determine the integrity of the existing piping after analysis of the piping section for tube wall thickness, scaling and corrosion. The analysis shall determine the ability for tie-in, pressure testing ability and remaining useful life. The contractor shall guarantee the piping integrity at the point of tie-in and subsequent acceptance. For existing piping not currently being used; the contractor shall pressure test in order to determine integrity and subsequent acceptance. Report all results in writing to the Architect/Engineer.

END OF SECTION

**SECTION 22 0500
COMMON WORK RESULTS FOR PLUMBING**

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 general requirements that apply to the Plumbing and Plumbing Controls.
- B. The following work is specified under other Divisions, unless otherwise noted or specified hereinafter:
 - 1. Electrical Power, Division 26.
 - 2. Installation of starters, contractors, thermal overload switches and remote push buttons, Division 26.
 - 3. Mechanical Division 23

1.3 INTENT

- A. Requirements specified herein shall govern applicable portions of Plumbing whether so stated therein or not.
- B. It is the intent of this specification and accompanying drawings to describe and indicate the general manufacture, erection and installation of the equipment and connection to same specified herein and shown on the drawings. It is not intended that the specifications and drawings describe and indicate each piece of equipment required for installation, for where items are intended or required for satisfactory installation and are considered to be the accepted practice of the trade, they shall be considered to be both specified and indicated. Drawings are diagrammatic in nature; for piping systems; water piping is tapped off the bottom of the pipe and steam and steam condensate piping is tapped off the top of the pipe; provide all tees, elbows and swing joints as required for hookup to coils or branch piping as required for this work whether they are indicated on the drawings or not.
- C. It shall be understood that the Contractor as hereinafter mentioned shall be the Plumbing Contractor unless specifically noted otherwise.
- D. The Contractor shall furnish all plant, labor and material necessary for the complete and satisfactory installation of all Plumbing work for this contract.
- E. The Contractor shall assume the entire responsibility for the materials, workmanship and satisfactory operation of the various mechanical systems, and other work as specified herein and/or as shown on the drawings.
- F. The Contractor shall schedule and coordinate all work in close cooperation with all trades working on this project.
- G. All drawings and portions of the drawings, all floor plans, risers, details, schematics and specifications indicated shall apply and are part of the plumbing contract.
- H. Any discrepancy or conflict noted between or within the above referenced documents shall be brought to the attention of the Architect/Engineer, in writing, a minimum of three (3) days prior to submittal of bids. The Architect/Engineer shall resolve issues prior to bid submittal.

- I. This Contractor shall carefully read the above-mentioned documents and study the drawings of all trades. He shall be responsible for neglect to read, or attend to, any paragraph or items contained therein. Failure to bring any conflicts or discrepancies to the attention of the Architect/Engineer, in writing, prior to bid submittal shall not constitute grounds for extras and/or change orders. Costs resultant from this failure shall be borne by this Contractor.

1.4 DEFINITIONS

- A. Following definition of terms and expressions used in this section are in addition to listing given in Supplementary Conditions:
 1. "Provide" shall mean "furnish and install" unless otherwise indicated.
 2. "Herein" shall mean the contents of a particular section where this term appears.
 3. "Indicated" shall mean "Indicated on contract drawings".
 4. 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, crawl spaces, and tunnels.
 5. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
 6. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
 7. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
 8. 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.
 9. The following are industry abbreviations for plastic materials:
 - a. ABS: Acrylonitrile-butadiene-styrene plastic
 - b. CPVC: Chlorinated polyvinyl chloride plastic
 - c. NP: Nylon plastic
 - d. PE: Polyethylene plastic
 - e. PVC: Polyvinyl chloride plastic
 10. The following are industry abbreviations for rubber materials:
 - a. CR: Chlorosulfonated polyethylene synthetic rubber
 - b. EPDM: Ethylene propylene diene terpolymer rubber
 11. .For additional abbreviations see the Abbreviations and Symbols Drawings.

1.5 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall be responsible for establishing grades and elevations, and checking of all interferences, and shall verify all dimensions and locations in the field.

- B. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, piping and approximate sizes and locations of equipment outlets. Mechanical trades shall follow these drawings in layout of their work, consult general construction, structural and electrical drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
- C. The Contractor shall verify with the A/E before bidding any item of piping or piping arrangement which may be incomplete, incorrect or indefinite. After contract is let, the A/E's decision shall be final.
- D. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such a manner that will in no way retard progress of construction. In instances where interferences develop, the contractor shall relocate the work as required by the A/E regardless of which work was installed first.
- E. Where job conditions require reasonable changes to indicated locations and arrangement, make such changes without extra cost to Owner. This is not to be construed to permit redesigning of the various systems.
- F. Additional and supplementary drawings may, from time to time, be furnished, and the same, when made, are to constitute a part of the original contract. These drawings will be made to clarify the contract drawings and will not depart materially therefrom.
- G. The A/E specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- H. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.
 - 1. Install all supply piping with adequate stops on each supply to all fixtures and or equipment to be connected to distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures and or equipment. Install stops in locations where they can be easily reached for operation.
- I. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture or equipment. Valves are specified in Divisions 22 and 23.

1.6 WORK INCLUDED

- A. These specifications, and accompanying drawings are intended to cover the furnishing by this Contractor of all labor, material and all equipment of every kind necessary for the complete installation of the various systems, and such other materials and equipment as hereinafter specified, and shall include, but not be limited to the following:
 - 1. Sanitary drainage and vent system within the building.
 - 2. Drainage specialties, including cleanouts, oil interceptor, floor & trench drains, etc.
 - 3. Domestic hot water recirculating system within the building as indicated.
 - 4. All piping, valves and fittings for the various systems.
 - 5. All expansion joints, loops, anchors and guides.
 - 6. Steel supports and hangers for all equipment and piping.
 - 7. Insulation for piping and equipment as herein specified.

8. All plumbing fixtures as hereinafter specified, including handicapped fixtures compliance with the handicapped code.
 9. All painting of pipe and equipment in the mechanical rooms and other unoccupied areas, and all painting of piping in no ceiling areas.
 10. Flush all water pipe and disinfect as specified.
 11. Setting of all sleeves and inserts in place.
 12. Testing, adjusting and placing in service all systems and equipment installed.
 13. Install all supply piping with adequate stops on each supply to all fixtures and or equipment to be connected to distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures and or equipment. Install stops in locations where they can be easily reached for operation.
 - a. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture or equipment. Valves are specified in Divisions 22 and 23.
 14. Domestic hot water system including valves, supply valves, supply piping, and return piping to fixtures and equipment requiring hot water as indicated.
 15. Complete propane gas piping system from the gas meter/regulator set to all fixtures and equipment within the building requiring gas. Terminate at heating equipment or water heating equipment with gas cock.
 16. Water supply specialties including shock absorbing devices, backflow preventers, wall hydrants, thermometers, etc.
 17. All excavation and backfilling required for the above work.
 18. All necessary valves, gas cocks and shutoffs.
 19. All plumbing fixtures, drains, floor drains, equipment, piping, fittings, valves, etc. shall be commercial for schools.
- B. The above is presented for general guidance only and does not necessarily cover the entire requirement of the project as shown on the drawings and/or as specified hereinafter.

1.7 SCHEDULE OF WORK

- A. The Contractor shall schedule all of his work to conform to the Job Progress Schedule as submitted by the General Contractor or Construction Manager, and approved by the A/E.

1.8 RELATED WORK SPECIFIED ELSEWHERE

- A. The following related work items are included in separate Divisions as follow:

1. General Requirements – Division 01
2. Roofing, thermal and Moisture Protection – Division 07
3. Painting – Division 09
4. HVAC – Division 23
5. Electrical – Division 26

- B. The following items of work related to plumbing will be performed by others as follows:

1. The General Contractor shall paint all piping in finished areas, provide all base flashing on roof, and build in all sleeves, unless otherwise noted.
2. The Electrical Contractor shall do all power wiring for plumbing equipment unless otherwise noted.
3. The General Contractor shall install all access panels furnished by the Plumbing Contractor.
4. The HVAC Contractor shall provide drainage piping from his equipment to drains provided by the Plumbing Contractor.

1.9 WORK AS A SUBCONTRACTOR

- A. When the plumbing work is subcontracted, the exact scope of work may be limited or added to at the discretion of the General Contractor. A subcontractor shall, therefore, verify the extent of his work with the General Contractor.

1.10 INTERFERENCE WITH THE OWNER'S NORMAL OPERATION

- A. All work shall be performed in such a manner as not to interfere with the normal work operations in adjacent spaces or buildings.
- B. In no way shall the Contractor:
 1. Block or restrict the means of egress for adjacent spaces.
 2. Decrease the fire rating of walls, partitions, ceilings, doors or combination thereof of adjacent spaces or of means of egress.
 3. Interrupt safety systems or in any way adversely affect the safety of people or materials in adjacent spaces.
- C. The Contractor shall provide acoustical isolation of the work area via temporary doors, partitions, etc., adequate to allow normal work functions.
- D. The Contractor shall provide exhaust fans, dust proof temporary partitions and any containment measure required to prevent dirt, dust, or fumes from reaching adjacent work spaces.
- E. All personal traffic and material delivery shall be routed so as to absolutely minimize travel through adjacent work area.

1.11 VISIT TO SITE

- A. The Contractor shall visit the site and thoroughly acquaint himself with all existing conditions relative to type and source of service available. He shall verify location and extent of these services and consider routing, interferences and excavation required by the contract and any and all other difficulties that may be encountered.
- B. Submission of a proposal shall be construed as evidence that such an examination has been made.
- C. Failure to visit the site shall not constitute sufficient reason to warrant claims for extra monies for difficulties not apparent in the contract documents.

1.12 MANNING THE PROJECT

A. The Contractor shall, upon initiation of construction, keep a suitable force of men on the site at all times in order to lace all sleeves, inserts, outlet boxes, fixtures and provide all other openings as are required for the satisfactory installation of equipment.

1.13 FEES AND PERMITS

- A. The Contractor shall secure all permits and pay all fees, required by local and state governing bodies, necessary to complete his phase of the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional monies from the Owner. The Owner shall be furnished with all certificates of approval.
- B. The Contractor shall provide insurance and bonding as required by the Building Owner or as stated in the General Conditions.

1.14 CODES AND STANDARDS

- A. The design, construction and installation of all materials and equipment shall be in compliance with the latest edition of all national, state and local codes or standards.
- B. The codes and standards referred to are minimum standards. Where the requirements of these specifications and the accompanying drawings exceed those of the codes and standards, the drawings and specifications shall be followed.

1.15 BASIS OF DESIGN

- A. The layout is based upon the use of particular items of equipment, identified by manufacturer's make and model number. Dimensions, arrangements and service connections required for these particular items have been considered in making the layout. The contractor may use the equipment of any manufacturer whose name is approved for substitution on that item of equipment after he had ascertained that all provisions of MATERIAL SUBSTITUTIONS will be complied with and that all required service connections will be made at no additional cost to the Owner.
- B. Except where dimensions are shown, the drawings are diagrammatic and shall not be scaled. Exact location of fixtures, apparatus, duct work and piping shall be determined by dimensions on the site. Contractor shall refer to architectural plans and details for exact dimensions.
- C. The drawings indicate the locations of apparatus, fixtures, and piping shall be followed as closely as possible. If before the installation it is found necessary to change the location to accommodate conditions at the building, such changes shall be made at no additional cost to the Owner, and as approved by the Architect/Engineer.
- D. Equipment requiring operation, service or maintenance during the life of the system shall be made easily accessible.
- E. Piping shall not be run within 48" of switchboards, panelboards or motor control centers.
- F. Use of open-flame devices in work shall be accompanied by fire extinguishing apparatus within 25 feet of work location. Provide Fire Watch review of the work during each shift.

1.16 QUALITY OF MATERIALS

- A. Where a specific model and manufacturer of equipment is specified, the Contractor shall provide what is specified without substitution. Where specified as "or approved equal", the Contractor may substitute equipment except that the burden is upon the Bidder to prove such equality. If the Bidder elects to prove such equality, he must request the Architect's approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty and cost.
- B. Where a specific model of equipment is specified along with an approval equal manufacturer, no substitution will be allowed. The Contractor shall submit one of the manufacturers listed.
- C. Final approval of competitive equipment is reserved by the Engineer when, in the Engineer's opinion, the equipment does not correspond to that specified.

1.17 MATERIAL SUBSTITUTIONS

- A. Material substitutions shall be allowed only where "or equal" is stated.
- B. Material substitution submittals shall, include complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance, test data and evidence that the proposed manufacturer or his established representative maintains a qualified service organization including spare parts and is available for competent service on short notice.
- C. Each bidder by submitting his bid represents that the proposal of such article, device, product, material, fixture, form or type of construction by name, make, catalog number of manufacturer which varies with the equipment specified shall be incorporated into the project without claims against the Owner for additional cost. The bidder shall be responsible for all additional costs incurred by others due to the substitutions.
- D. The Architect/Engineer shall have the final approval of all submitted substitutions.

1.18 SUBMITTALS

- A. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall bear a stamp or notation indicating that the Contractor has reviewed and approved the submittals.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- D. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- E. Submit each section separately and include the following:

1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Submittals on all pumps shall be complete with performance curves marked with the design points.
 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
 4. Vibration isolators shall include operating weight and load distribution at each mounting point.
- F. The Contractor agrees that failure of manufacturer's submittal to conform to the above will result in a manufacturer's disqualification on this project.
- G. Submit samples as directed of items called for in the specifications; samples of the materials which the manufacturer will actually ship shall be submitted for approval after award of contract and properly labeled on this project.

1.19 PRODUCT HANDLING

- A. Following is in addition to Protection of Work and Property, General Requirements:
1. Responsibility for care and protection of mechanical work rests with the Contractor until it has been tested and accepted.
 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage from all causes.
 3. Protective covers, skids, plugs, caps and coating shall be provided to protect equipment materials from damage during construction.
 4. All equipment and material shall be stored under cover and off the ground.
 5. For outdoor storage, protective covers of sheet plastic shall be provided. Covers shall be of gauge required for the area involved and shall be reinforced to withstand wind, rain, sleet and snow. Equipment and material shall be set on skids or platforms of sufficient height to avoid deterioration from spattering and ground water.
 6. Plug open ends of pipes when work is stopped to prevent debris from entering the pipes.
 7. Protect plumbing fixtures and other equipment with enamel or glazed surface, from damage by covering and/or coating, as recommended in Bulletin "Handling and Care of Enameled Cast Iron Plumbing Fixtures," issued by Plumbing Fixture Manufacturers' Association.
 8. Coat polished or plated metal parts with Vaseline immediately after installation.
- B. The Contractor shall receive, properly house, handle, hoist, and deliver to proper location, equipment and other materials required for the contract.
- C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

1.20 COORDINATION DRAWINGS

- A. Detailed layout shop drawings on all systems as required in Division 01 – Project Coordination, Division 22, 23, and 26, must be coordinated with field erection drawings for Architectural, HVAC, Plumbing, Fire Protection, and Electrical Systems by the respective contractors.
- B. Prepare coordination drawings for all areas by building, floor area and/or phase, of the project. Close attention should be implemented where limited space availability necessitates maximum utilization of space for efficient installation of different components.
- C. Mechanical, Electrical and Plumbing Prime Contractors are responsible to prepare coordination drawings to a Scale of $\frac{1}{4}'' = 1'-0''$ or larger; detailing major elements, components, and systems of mechanical and electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including but not limited to the following:
 - 1. Proposed locations of ductwork, piping, conduit, equipment, and materials.
 - 2. Clearances for installing and maintaining insulation.
 - 3. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - 4. Equipment connection and support details.
 - 5. Exterior wall and foundation penetrations.
 - 6. Fire rated wall, floor, ceiling, and roof penetrations.
 - 7. Sizes and location of required concrete pads and bases.
 - 8. Valve stem movement.
 - 9. Sleeves.
- D. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations. Clearly define relationships between sleeves, piping, ductwork, conduit, ceiling grid, lighting, fire sprinkler, HVAC equipment and other mechanical, plumbing, and electrical equipment with other components of the building such as beams, columns, ceilings, and walls.
- E. Prepare reflected ceiling plans to coordinate and integrate installations of air outlets and inlets, light fixtures, communication systems components, sprinkler, and other ceiling mounted items.
- F. Resolve conflicts between trades, prepare composite coordination drawings and obtain signatures from all affected Prime Contractors on original composite drawings. Submit coordination drawings to the Architect/Engineer and Construction Manager for approval.
- G. Mechanical, Electrical and Plumbing Prime Contractors are to first submit their respective shop drawings for approval, to the Architect/Engineer, in order to make any necessary changes prior to going through the coordination process.

- H. Coordination drawings to be signed off by affected Contractors within 45 days of Notice to Proceed. A Coordination drawing timeline schedule shall be developed and tracked.
- I. The coordination drawings shall be coordinated with the construction and phasing schedule.
- J. The routing process will begin with the HVAC Contractor who shall take the lead in the coordination of their work with all affected trades.
- K. The HVAC Contractor shall prepare CAD drawings to be used as the basis for coordination drawings in all areas or as determined by the Construction Manager (Scale: 1/4" = 1'-0" or larger). These drawings shall be completed in digital format. All architectural features shall be accounted for in preparation of this drawing; i.e., permanent, casework, interior columns, partitions, finish ceiling and height, lighting and roof elevations, etc. The HVAC Contractor will provide CAD files and drawings showing all of the approved ductwork. HVAC Contractor is to locate all piping with orange lines. Forward drawings to the Plumbing Contractor.
- L. The Plumbing Contractor is to locate the plumbing lines with blue lines and sprinkler lines and head locations with red lines, and resolve all conflicts and determine locations and elevations, and forward drawing to the Electrical Contractor.
- M. The Electrical Contractor to indicate all lighting fixtures, panels with associated clearances, duct banks, bus duct, conduit racks and all individual conduits 1 1/2" and larger in with green lines, and resolve all conflicts and determine locations and elevations and forward to the General Construction Contractor. The General Construction Contractor will have the last coordination review. Provide overlaid coordination drawings for all General Construction work and resolve all conflicts. All architectural features shall be detailed clearly, i.e. permanent casework, interior columns, partitions, finish ceiling and roof elevations, etc. Provide a ceiling layout detailed coordination drawing showing ceilings, lights, diffusers, etc.
- N. Contractors to provide underground coordination drawings for all underground utilities; show exact location of piping stub ups, floor drains, etc. as required.
- O. Prime Contractors shall be responsible for all costs associated with creating CAD files.
- P. All coordination meetings will be held in the Construction Manager's field office or as required by the Architect/Engineer. As each coordination drawing is completed, Contractors are to meet with the Construction Manager to review and resolve all conflicts on the coordination drawings. Contractors are required to distribute shop drawings, cut sheets and submittals to other Prime Contractors where appropriate. Approved coordination drawings will also be available for reviewing at the Construction Managers field office.
- Q. All Contractors shall provide a hard copy of the coordination drawings for review by the Architect/Engineer.
- R. Once complete and signed off, the HVAC, Plumbing and Electrical Contractors will submit dimensioned wall and slab penetration drawings and housekeeping pad drawings to the appropriate parties.
- S. If the coordination drawing process is not complete, Mechanical, Electrical and Plumbing Contractors will provide wall penetration drawings to the General Construction Contractor no later than five (5) days prior to wall erection.
- T. All Prime Contractors must install the work in accordance with the coordinated drawings at no additional cost to the Owner. No additional compensation will be made for extra ductwork offsets, piping and/or conduit or retrofit work due to improper component location, or lack of Contractor(s) coordination.

- U. All Prime Contractors shall take special care in verifying with the Electrical Contractor that the equipment matches the characteristics of the power being supplied. The Electrical Contractor is similarly bound.
- V. The Mechanical, Electrical and Plumbing Drawings are schematic in nature and are not intended to show every offset and detail. The Mechanical, Electrical and Plumbing Contractors will make adequate provisions in their bid to accommodate the actual conditions, provide all required ductwork, piping and conduit offsets per the coordination drawings, without additional cost to the Owner.
- W. The Mechanical, Electrical and Plumbing Contractors shall hang streamers from all above ceiling equipment that will require access. This is in addition to any specification requirements for tags, labels, etc. Shop drawings should also highlight these areas for Architect/Engineer's review. In addition, the Contractors shall notify the Construction Manager and Architect/Engineer of all areas where equipment maintenance access is difficult. Coordinate architecturally placed access doors with points of mechanical/electrical systems requiring that access.
- X. Specific Requirements – Required Information to be provided on Coordination Drawings:
 - 1. General Construction/Structural Work Information including but not limited to:
 - a. Openings and sleeve locations required in slabs, walls, beams, and other structural elements, including required openings not indicated on the Contract Documents.
 - b. Slab edge locations
 - c. Embed locations, as described above. Note embedded steel angles at edges of sump and sewage ejector pits, to accept basin covers.
 - d. Wall and chase spaces for housing HVAC, Plumbing, or Electrical items.
 - e. Access doors in coordination with the respective contractor systems.
 - f. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
 - 2. HVAC Work Information including but not limited to:
 - a. Sizes and bottom elevations of rectangular ductwork, including angle bracing, flanges, and support systems.
 - b. Sizes and centerline elevations of round ductwork, piping and conduit runs
 - c. Acoustical lining in ductwork.
 - d. Identification of ductwork pressure class.
 - e. Dimensions of major components, such as dampers, valves, diffusers, registers, cleanouts, coils, VAV boxes, HVAC equipment, and electrical distribution equipment.
 - f. Fire-rated enclosures around ductwork.
 - g. Access panels required.

- h. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination
- 3. Plumbing and Fire Protection Information including, but not limited to:
 - a. Sizes and centerline elevations of piping runs.
 - b. Locations of plumbing valves, equipment, and fixtures.
 - c. Locations of standpipes, floor control assemblies, fire hose valves, mains, piping, branch lines, pipe drops, sprinkler heads, fire pumps/controllers, and jockey pumps.
 - d. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
- 4. Electrical Work Information including, but not limited to:
 - a. Runs of vertical and horizontal conduit, 1 ¼" diameter and larger
 - b. Light fixture locations
 - c. Exit light locations
 - d. Smoke detector and other fire alarm locations
 - e. Panelboards, switchboards, switchgear, transformers, busways, generators and motor control center, exit signs, and emergency battery pack locations.
 - f. Locations of pull boxes and junction boxes, dimensioned from column centerlines
 - g. Access panels required.
 - h. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.
- 5. Ceiling Systems and Plenum Space Information including, but not limited to:
 - a. For HVAC, Plumbing, Fire Protection, Fire Alarm, Electrical, Controls and Telecommunications Work penetrating acoustical ceilings, show locations of each item (including sprinkler heads, diffusers, grilles, access doors, light fixtures, smoke detectors exit signs, speakers, and other visible ceiling mounted devices) relative to the acoustical ceiling grid.
 - b. Locate components within ceiling plenums to accommodate layout of light fixtures indicated on Drawings. Clearly indicate areas of conflict between light fixtures and other components on Coordination drawings.
 - c. Other specific/critical conditions unique to this Project, not noted above but necessary to assure proper coordination.

- Y. The Sheet Metal Contractor shall prepare his work on reproducible and submit 1/4" scale CAD drawings of the sheet metal duct field erection shop drawings for the coordination procedures, and each Contractor will supply the necessary qualified personnel for these procedures which will be conducted by the General Contractor. The HVAC, Plumbing and Fire Suppression work to the drawings where conflicts are noted and achieve solutions to any conflicts that may exist.
- Z. The General Contractor will be required to signify his acceptance of the results of the coordination procedures by signing and dating the master coordination print.
- AA. Each Contractor will be required to correct his field erection drawing(s) used as a basis for the coordination procedures to complement the results of the procedures prior to submitting same for approval. No field erection shop drawings will be accepted for approval without having been coordinated.
- BB. As part of the coordination procedures, applicable "Approval" or "Approved as Noted" copies of other trades' shop drawings will be transmitted to the Contractor. It will be each Contractor's responsibility to check these shop drawings to ascertain what effect, if any, these shop drawings have on that portion of the work under his direct responsibility. Each contractor will advise the General Contractor within forty-eight (48) hours of receipt of the shop drawings, in writing, indicating receipt of same and whether or not they have any effect on the work of his contract.

1.21 ELECTRICAL

A. Power Wiring

- 1. For the purpose of this specification, power wiring shall be defined as follows:
 - a. All wiring from the power source panelboards (or switchboard) to the disconnect switch to the equipment, and final connection to the equipment.
 - b. All wiring to control panels as indicated in the Electrical and Plumbing Contract Documents. (All control panels not indicated on the Electrical Contract Documents as receiving power shall do so by jumpers from other control panels, this wiring shall be considered control wiring as defined below).
- 2. All power wiring from the power source to the above noted switches and wiring from these switches to the equipment, including final connection to same, shall be provided under Division 26, Electrical.

B. Control Wiring

- 1. All other wiring required, whether line voltage or low voltage, internal or external to provide for the operation of the equipment shall be considered as control wiring.
- 2. All control wiring throughout the building, including wiring installed at piping, or as specified shall be provided under this Division 23.

- C. The Contractor shall furnish all motors, mounts, motor starters and remote mounted push-button controls for all electrically operated equipment furnished as part of the contract. The Contractor shall furnish all safety disconnects where described hereinafter. The Contractor shall furnish all speed control switches for all multi-speed motors. All motors shall have copper windings. (Aluminum windings will not be acceptable).

- D. This Contractor is completely responsible for the coordination with all other trades as to the correct voltage for all equipment requiring power. Equipment and or changes required to meet the project voltages will be the responsibility of this contractor.
- E. All push-button switches and starters shall be mounted under Division 26, Electrical.
- F. The Contractor shall provide all controls and control devices, all mounting for controls and all other electrical devices as specified and necessary for the complete installation and satisfactory operation of all electrically operated controls furnished under this Division.
- G. All locally mounted starters shall be furnished under Division 22, except as noted below. Where indicated hereinafter, starters shall be furnished as an integral part of equipment. Starters furnished in motor control centers shall be provided in Division 26, Electrical (refer to Electrical Drawings). Control of starters in motor control centers feeding plumbing equipment shall be provided under Division 23.
- H. Starting equipment of each motor shall be of the proper voltage and HP rated for the motor it is to serve. All starters shall be of the enclosed type; NEMA Type 1, for general-purpose enclosures; NEMA Type 4 for watertight enclosures, and NEMA Type 12 for the dust-tight enclosures. Location of motor shall determine type of enclosure to be used.
- I. Manual motor starters for single-phase motors shall be one or two poles as required, consisting of a snap switch combined with a thermal overload device. It shall be impossible for the switch to be held in a closed position under a sustained motor overload. For resetting the overload mechanism, the switch lever shall be of a design where it has to be moved to the "off" position. Starter shall be enclosed in type of enclosure for area in which it is to be used.
- J. Magnetic starters for 3-phase motors shall be furnished with 110 volt holding coils, 120-volt fused transformers, normally open and normally closed auxiliary contact and overload relay heater elements in all three phases. Provide hand/off/auto selector switch along with running status lights and external reset button.
- K. Locate starters and associated starter controls in accessible locations wherever possible. Location of starters for roof mounted equipment above ceilings shall be located at accessible locations above ceiling. Locations shall be coordinated with furniture and equipment layouts for the optimum accessible location for installation and maintenance means
- L. The Contractor shall be completely responsible for the coordination control system with control interlocks between various items of plumbing equipment.

1.22 SCAFFOLDING

- A. The Contractor shall furnish and install scaffolding, ladders and runways required in connection with his work.

1.23 TEMPORARY OPENINGS

- A. Temporary openings not indicated, which may be required for purpose of bringing equipment into building, shall be as approved. General Contractor will perform work of providing and maintaining openings, and of restoring structure; but Contractor for whom temporary openings are provided shall bear costs thereof, and for restoring structure. Ample notice shall be given of size and location of such openings by Contractor requiring same.
- B. Holes provided in General Construction work to permit installation of lines for temporary services will, after removal of such lines, be patched as specified under Division 01.

1.24 TEMPORARY SERVICE

- A. Temporary services are specified under Division 01, "General Requirements".

1.25 EXCAVATION

- A. All excavation is unclassified. The Contractor shall inspect the site and make allowance in his bid for soil to be excavated since no compensation will be given where rock is encountered.
- B. The Contractor, unless otherwise noted on the drawings, shall do all excavations for trenches, foundations, and pits of whatever kind necessary for the installation of this work. Bottom of trenches shall have the proper uniform grade wherever possible, or unless otherwise directed.
- C. Trenches are to be excavated to the widths, lines and grades indicated on the drawings and/or specified in the appropriate sections of these specifications. Trenches for piping are to be excavated to a minimum width of one (1) foot plus the outside diameter of the pipe. The trench shall be excavated in a manner such that the pipe will be located in the center of the trench with the trench bottom having the proper uniform grade in the direction of flow. Trenches shall be deep enough to provide a minimum of four (4) feet fill over the piping except as may be otherwise indicated on the drawings.
- D. In each excavation, trenches shall be carried to six inches below invert of pipe. Pipe shall be surrounded in all directions by a six-inch layer of selected crushed stone or gravel. If rock is encountered, carry trench to a point six inches below pipe invert. No pipe shall be bedded directly upon rock but shall be cushioned by a six-inch layer of selected crushed stone or gravel.
- E. The Contractor shall do any shoring, bracing, etc., necessary to maintain the banks of his excavation, shall make good and damage done to property of adjoining premises or work of other contractors due to his failure to properly shore his excavation. The Contractor shall do all pumping required to keep his excavations free of water including rental of pumps, temporary power and labor.
- F. All excavations shall be left open until work has been inspected and approved by the Architect. Sufficient time shall be allowed after notice is given that work is ready for inspection for making all examinations and tests. Under no circumstances shall excavated material be left even temporarily, where it will interfere with the building or other Contractor's operations.
- G. Excavations which pass under or within eighteen (18) inches of columns or wall foundations shall be backfilled up to the level of columns or wall foundations with concrete mixed in proportions to one part cement, three parts sand and five parts coarse aggregate. Excavations shall not undermine foundations at a slope of 1:1 or greater.
- H. All earth backfilling shall be made in layers not to exceed eight (8) inches and each layer shall be thoroughly tamped into place before the next layer is placed. Backfilling shall be clean earth, free of stone, pieces of concrete, rubbish and other foreign materials. Material frozen in lumps or material softer than the adjoining soil shall not be used in backfilling. The Contractor shall distribute on the premises as directed, all earth remaining after the backfilling.
- I. Any necessary blasting shall be performed by experienced and competent personnel in the most careful manner. All local ordinances and laws relating to blasting and storing of explosives must be strictly observed. No explosives shall be stored in the project properly. All contractors shall be notified prior to any blasting.

- J. Explosives used shall be subject to approval of the Architect. The blasting shall be properly covered with blasting mats.
- K. Any rock encountered within five (5) feet of pipes of building walls shall be removed without blasting. Any blasting required shall be performed at such times as to meet reasonable request of the Architect.
- L. The Contractor will do all patching of bituminous surfaces, concrete walks, driveways, streets, etc., necessary to complete his work. All patching shall match the existing surfaces. Painting shall be done by personnel skilled in their trades.
- M. Provide adequate temporary crossovers for pedestrian and vehicular traffic including guard rails, lamps, flags, as directed; remove same when necessity for such protection ceases.

1.26 CUTTING AND PATCHING

- A. The Contractor shall provide all floor and wall cuts as required for piping penetrations of existing construction.
- B. No cutting of bearing walls, beams, etc., shall be done without the approval of the Architect. All patching and finishing, etc., shall match the surroundings. All cutting and patching shall be done by workmen skilled in the trades and in the employ of the General Contractor for the project. All cutting shall be done with saw type edges to give a neat and workmanlike appearance. All pipe holes shall be core drilled unless specified otherwise.
- C. Should it be necessary to do any cutting and patching due to the failure of this Contractor to give proper information to the General Contractor, it shall be done at the expense of the Plumbing Contractor.

1.27 PAINTING AND FINISHING

- A. Except as specified herein, the finished painting of Plumbing Work within the building and on the roof shall be as specified under Division 09.
- B. All mechanical equipment shall have a factory-applied prime and finish coat of paint. Galvanized surfaces shall be considered as finished surfaces for equipment rooms and items concealed from view. Plastic products shall be acceptable without a finish coat of paint. All items of equipment marred or rusted, even though factory finished, shall be repainted; steel angles and steel supports for ductwork, piping or miscellaneous equipment shall have a prime coat of paint before installation.
- C. Paint all exposed piping, equipment, and trim that does not have a factory applied finish. Refer to Division 09 "Painting" for paint materials, surface preparation and application of paint. Paint shall be semi-gloss, acrylic-enamel paint. Coat components with two (2) coats of finish paint over two (2) coats of rust inhibitive metal primer or approved equivalent based on component type.

1.28 CONCRETE WORK

- A. Concrete work shall be in accordance with Division 03.
- B. Provide 4" high concrete pads for floor mounted plumbing equipment as indicated on drawings.

1.29 SUSPENSION SUPPORT FOR EQUIPMENT

- A. All pipes and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points, supplementary steel members shall be added by the Contractor as required to adequately support the load.
- B. Pipes and ducts shall not be supported from other pipes, ducts, or equipment.
- C. Hangers from joists shall be attached at the panel points. Pipes and ducts with weights of 50 pound per foot (total for single or multiple runs) routed parallel with bar joists shall be supported from a minimum of 3 joists at each hanger point (channel members between joists).

1.30 ACCESS PANELS – BUILDING

- A. Valves and equipment located concealed in walls or above ceilings, and are otherwise inaccessible shall be furnished with an access panel for each location. A hinged inconspicuous type access panel complete with frame, of such size and so located as to provide proper access for service and maintenance.
- B. The minimum size of each access panel shall be 18" x 18" unless physical restraints require a smaller door.
- C. Where such equipment is located above removable concealed spline push up type acoustical tile or metal pan ceilings, it shall be considered as accessible if the acoustical material is arranged for access to the space above the ceilings.
- D. Access panels shall be Milcor "DW", or equal, for drywall locations and Milcor "K", or equal, elsewhere.
- E. Panels and frames shall be prime painted.
- F. Panels shall be furnished under this Division and installed under another Division of this Specification.
- G. Panel material shall be steel except that construction shall be all aluminum in bathroom applications.
- H. When access panels or doors are installed in fire rated construction, they shall be fire rated to match the construction.

1.31 FIRESTOP PENETRATION PROTECTION SEALING SYSTEM

- A. Where pipes pass through fire partitions, firewalls, floors or ceilings, install a firestop that provides an effective barrier against the spread of fire, smoke, gases and water. Fire-stop material shall be packed tight, and completely fill clearances between pipe, sleeves and structure. All crack voids or holes (up to 4" diameter) shall be sealed using 3M brand Fire Barrier Caulk CP25 or putty 303 or an approved equal. Larger diameter or square holes, 3M system 7902, 7904, 7902R or 7904R or approved equal shall be in accordance with manufacturer's instructions.

- B. Fire-stopping material shall maintain its integrity while preventing the passage of flame, smoke, gases or water. Fire-stopping material shall be a one-part, intumescent elastomer noncombustible, noncorrosive and compatible with synthetic cable jackets as defined by ASTM E814 (UL 1479); and in addition for insulation materials, melting points shall be a minimum of 1700 degrees F for one-hour protection and 1850 degrees F for 2-hour protection.

1.32 RECORD DRAWINGS

- A. The Contractor shall furnish record as-built drawings to the Architect at completion and acceptance of the job. Transparencies of the original drawings with corrections shall be submitted as specified in the General Requirements.
- B. Record all changes from installation originally indicated. Record final location of underground lines by depth from finished grade and by offset distances in feet and tenths to surface improvement such as buildings, curb, or edges of walks. Where work appears on two or more drawings, Contractor shall mark changes on all drawings. Contractor shall mark changes on all drawings. At completion, furnish the above required transparencies to the A/E for approval and record. Drawings shall be certified to be record of work installed and signed by the Contractor. Work shall not be accepted until such drawings have been delivered to the A/E.

1.33 GUARANTEE

- A. In addition to the requirements stated in the specifications, the Contractor must guarantee all equipment, materials, and appurtenances installed by him to be free from all defects for a period of one year from date of final acceptance.
- B. Upon written notice from the A/E, the Contractor shall promptly correct all defects without additional cost to the Owner. This Contractor shall adjust each part of the entire installation for proper working order. Reports are to be submitted to the A/E and adjustments repeated until the entire system is satisfactory. This Contractor must make good, at his own expense, any defects in materials or workmanship that may appear.

1.34 CLEAN UP

- A. The Contractor shall be held responsible for the general clean-up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.
- B. All stickers, rust, stains, labels and temporary covers shall be removed before final acceptance.
- C. Foreign matter shall be blown, vacuumed or flushed out of piping, pumps, fans, motors, devices, switches, panels, and equipment.
- D. Identification plates on equipment shall be free of excess paint and shall be polished.

1.35 OPERATION AND MAINTENANCE MANUALS

- A. Submit to the Engineer for approval three manuals covering details of operation maintenance for all apparatus requiring service. The Contractor shall arrange formal instruction sessions by competent representatives of the manufacturer for the Owner's operating personnel to cover the following:
 - 1. Plumbing Fixtures (all)

2. Service telephone number, fax number, websites, email addresses, business and service addresses and mobile telephone numbers of the installing contractor, and manufacturer and supplier and parts counters of pumps, water heaters, backflow preventers, and other components comprising the systems.
 3. Manufacturer's operating and maintenance manuals, including detailed parts lists with numbers, power and wiring diagrams for each piece of equipment and accessory requiring services or maintenance, the guarantee period and the name, address and phone number of the nearest sales and service organization for each item. Both on print and CD's (min 3 copies) form (PDF/MS Word).
 4. Cross out options that are not used on equipment sheets, highlight options selected.
 5. Step-by-step procedure for starting, stopping, setpoint adjustment, monitoring and alarm enunciation for each system.
 6. Copies of inspection certificates provided by the City, County, State and insurance companies.
 7. Routine maintenance procedures for all plumbing equipment.
- B. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of the manuals.

1.36 INSTRUCTION TO OPERATIONAL PERSONNEL

- A. Plumbing Fixtures (all)
- B. Furnish the services of competent instructors to give full instruction to the designated Facilities personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system on the Contract Documents. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work.
- C. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. Provide 8 man-hours each of instruction for, pumps, water heaters, compressors, air dryers, vacuum pumps, and other equipment required by the Owner's personnel.
- D. Instruction shall cover routine maintenance, wiring and power wiring diagrams and component analysis, preventative maintenance and scheduling, starting and stopping, alarm resets, trend-logging, setpoint adjustment, emergency and normal shutdown/startup, relative pressure control system for the morgue, alarm date stamping and all else required by the Owner for complete usage/maintenance/adjustment of equipment in their intended systems.
- E. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of instructions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Materials and equipment shall be in accordance with the specifications as outlined in each specification section describing plumbing components, fixture valves, piping, etc.
- B. All components shall be according to ASTM, ANSI, CISPI, NFPA and Code standards.
- C. Electrical equipment shall bear the underwriter label.

3.2 SITE INSPECTION

- A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.3 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specification to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule
2. Preparation of the Schedule of Values
3. Installation and removal of temporary facilities and controls
4. Delivery and processing of submittals
5. Progress meetings
6. Pre-installation conferences
7. Project closeout activities
8. Startup and adjustment of systems
9. Project closeout activities

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into the work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequenced.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Number of Copies: Submit three opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned. Markup and retain one returned copy as a Project Record Drawing.
3. Refer to individual Sections for Coordination Drawing requirements for work in those Sections.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

3.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

3.6 PROJECT MEETINGS

- A. General: Attend meetings and conferences at Project Site, unless otherwise indicated.
 1. Agenda: Be prepared for the meeting agenda. Distribute the agenda to all invited attendees.
 2. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Attend a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule
 - b. Phasing
 - c. Critical work sequencing and long-lead items
 - d. Procedures for processing field decisions and Change Orders
 - e. Procedures for requests for interpretations (RFIs)
 - f. Procedures for testing and inspecting
 - g. Procedures for processing Applications for Payment
 - h. Submittal procedures
 - i. Preparation of Record Documents
 - j. Use of the premises and existing building
 - k. Work restrictions
 - l. Owner's occupancy requirements
 - m. Responsibility for temporary facilities and controls
 - n. Construction waste management and recycling
 - o. Parking availability
 - p. Office, work, and storage areas
 - q. Equipment deliveries and priorities
 - r. First aid
 - s. Security
 - t. Progress cleaning
 - u. Working hours
 3. Minutes: Record and distribute meeting minutes.
- C. Pre-installation Conferences: Attend a pre-installation conference at Project Site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction Manager of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents
 - b. Deliveries
 - c. Review of mockups
 - d. Possible conflicts
 - e. Time schedules
 - f. Manufacturer's written recommendations
 - g. Acceptability of substrates
 - h. Temporary facilities and controls
 - i. Coordination with other work
 - j. Protection of construction and personnel
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Attend progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:

- 1) Interface requirements
 - 2) Status of submittals
 - 3) Off-site fabrication
 - 4) Site utilization
 - 5) Hazards and risks
 - 6) Progress cleaning
 - 7) Status of correction of deficient items
 - 8) Requests for interpretations (RFIs)
 - 9) Status of proposal requests
 - 10) Pending changes
 - 11) Status of Change Orders
 - 12) Pending claims and disputes
 - 13) Documentation of information for payment requests
3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Equipment locations: All plumbing equipment shall be located to provide for manufacturer's recommended clearances, clearance for routine maintenance, clearance per code requirements and locations/clearances required for removal/replacement in the future.
1. Manufacturer's recommended clearances shall include space for proper airflow and non-short circuiting airflow pathway (plumbing equipment, etc), clearance for pumps (18" minimum around pumps), 30" clearance or complete access door swings clearances for tube pulls (heat exchangers, coil pulls, etc); locate piping to be clear of these locations.
 2. Provide minimum 36" clearance around water heaters, heat exchangers and other pressure vessels; note this is a minimum requirement, provide excess wherever possible. Provide minimum 48" clearance from power panels per the latest edition NEC having jurisdiction; include requirements for piping and ductwork at such locations.
 3. Locate equipment in mechanical rooms to allow for future removal and replacement. Include heights to overhead piping where applicable. Wherever possible, clearances shall include removal/replacement as a whole entity without knock-down.
 4. Access platforms with metal grating shall be provided for equipment located outdoors such for power and control panels for equipment located on dunnage. This access system shall provide for maintenance and requirements per codes having jurisdiction. Platforms shall include stairs and handrails per OSHA regulations.
 5. Locate roof mounted equipment minimum 10' away from edges of roof. Where equipment is located closer, provide handrail system at roof edge as required per codes having jurisdiction. Maintain clearances from handrail system to power panels.
 6. Locate air intakes 25' away from exhaust outlets and plumbing vents for healthcare facilities.

7. Locate air intakes for kitchen air intakes min 10' away from exhaust outlets and plumbing vents from kitchen exhaust fans.

3.7 CONNECTION TO EXISTING UTILITIES

- A. If connecting to an existing piping system (water, gas, oil, sewer, steam, condensate, etc.). It shall be the responsibility of this contractor to verify the integrity of the piping system being connected. Coordinate all system shutdowns with the owner. All applicable testing and acceptance will apply.
- B. Existing Pipe Testing: The contractor shall remove a section of piping at the point of connection between new and existing. The contractor shall determine the integrity of the existing piping after analysis of the piping section for tube wall thickness, scaling and corrosion. The analysis shall determine the ability for tie-in, pressure testing ability and remaining useful life. The contractor shall guarantee the piping integrity at the point of tie-in and subsequent acceptance. For existing piping not currently being used; the contractor shall pressure test in order to determine integrity and subsequent acceptance. Report all results in writing to the Architect/Engineer.

END OF SECTION

SECTION 22 0529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General - Purpose Piping; 2013.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2014).
- H. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- I. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- J. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.05 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
- B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
- C. Materials for Metal Fabricated Supports: Comply with Section 05 5000.
 - 1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
 - 2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.
- D. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
 2. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Piping up to 1 inch: 1/4 inch diameter.
 - b. Piping larger than 1 inch: 3/8 inch diameter.
 - c. Trapeze Support for Multiple Pipes: 3/8 inch in length.
- C. Beam Clamps:
1. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
 2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
 3. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
- D. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
 2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
 3. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
 4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.
- E. U-Bolts:
1. MSS SP-58 Type 24, carbon steel u-bolt for pipe support or anchoring.
- F. Pipe Hangers:
1. Hangers:
 - a. Provide hinged split ring and yoke roller hanger with epoxy copper or plain finish.
 - b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
 - c. Provide hanger rod and nuts of the same type and material for a given pipe run.
 - d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.

- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Pipe Markers: 3/4 inch diameter and higher.

2.02 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe markers.

2.03 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- C. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- D. Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 - a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
 - 2. Secondary: Color scheme per fluid service.
 - a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
 - 3. Tertiary: Other Details.
 - a. Directional flow arrow.
 - b. Owner Defined: "CONDENSATE DRAIN".
- E. Color code as follows:
 - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping
- C. Apply stencil painted identification in compliance with Section 09 9123 requirements. Identify unit with assigned id-number and area being served using pipe marking rules.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.

- F. Apply ASME A13.1 Pipe Marking Rules:
1. Place pipe marker adjacent to changes in direction.
 2. Place pipe marker adjacent each valve port and flange end.
 3. Place pipe marker at both sides of floor and wall penetrations.
 4. Place pipe marker every 25 to 50 feet interval of straight run.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Evaporator condensate drainage system piping.
- B. Storm drainage piping, buried within 5 feet of building.
 - 1. Pipe hangers and supports.
 - 2. Cleanouts

1.02 REFERENCE STANDARDS

- A. ASME B31.9 - Building Services Piping; 2014.
- B. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
- C. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.
- D. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.
- E. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.
- F. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- H. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements for additional provisions.
 - 2. Valve Repacking Kits: One for each type and size of valve.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

2.02 EVAPORATOR CONDENSATE DRAINAGE SYSTEM PIPING

- A. Condensate generated by evaporator coils, or by similar cooling means, and not as a by-product of fuel-burning combustion equipment, shall be disposed by a fabricated system that satisfies the following conditions:
 - 1. Collection: corrosion resistant drain pan sloped to a drain pipe not smaller than 3/4" in diameter.
 - 2. Slope: Horizontal piping sloped not less than 1/8" vertically per 12" of horizontal pipe.
 - 3. All indoor material: PVC
 - 4. All outdoor material: Copper
 - 5. Exterior wall penetration material: Copper
 - 6. Exterior termination: Copper fitting with insect screen (see drawings).
 - 7. Size (serving up to 20 tons cooling): minimum 3/4" (see drawings).
 - 8. Size (serving between 20 and 40 tons cooling): minimum 1" (see drawings).
 - 9. Specialties: cleanouts, couplings, unions, air gaps.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 0516.
- F. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- G. Install water piping to ASME B31.9.

3.03 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.04 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- B. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- C. Maintain disinfectant in system for 24 hours.
- D. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- E. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

3.06 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inch to 1-1/4 inch:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inch to 2 inch:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

SECTION 23 0000
GENERAL PROVISIONS - MECHANICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. The work to be completed under this division of the specifications shall include the furnishing of all supplies, equipment, labor, supervision and all materials not specifically mentioned, ready for use, in accordance with all applicable codes and authorities having jurisdiction, including heating, ventilation, air conditioning, plumbing, sprinkler equipment, associated items and Automatic Temperature Control components. It is the intention of these specifications and drawings to indicate finished work that is tested and ready for operation including but not limited to:
1. Removals.
 2. Cutting and Patching
 3. Piping.
 4. Drainage from noted equipment to floor drains, roof, sink, or funnel drains.
 5. Piping connections to equipment.
 6. Vibration isolation elements for piping and equipment.
 7. Equipment isolation bases.
 8. Seismic restraints for isolated and non-isolated ductwork, VAV boxes, and equipment
 9. Testing.
- B. The data indicated in these drawings and specifications are as exact as could be secured but their absolute accuracy is not guaranteed. Do not scale drawings. Exact locations, distances, levels and other conditions will be governed by the building. Use the drawings and specifications or guidance and secure the engineer's approval of changes in locations.
- C. Construction methods and good installation practice.
1. The contractor shall visit the site and become thoroughly familiar with all existing conditions under which the work and work of other trades will be installed. This contract includes all necessary offsets, transitions, modifications and relocation required to install all new equipment in new or existing spaces. Contractor shall include any modifications required in existing ductwork and/or equipment for installation of new HVAC equipment and new equipment of other trades. All new and existing equipment and systems shall be fully operational under this contract before the project is considered complete.
 2. The contractor shall be held responsible for any assumptions that are made, any omissions or errors made as a result of failure to visit the site and become thoroughly familiar with the existing conditions and the contract documents of all trades.

1.03 DEFINITIONS

- A. Refer to Section 01 4216 -Definitions.

1.04 CODES, REGULATIONS AND STANDARDS

- A. Refer to Section 01 4100 -Regulatory Requirements for additional requirements
- B. Published specifications, standards tests, or recommended methods of trade, industry or governmental organizations apply to work in all Sections as noted below:
1. ASHRAE -American Society of heating, Refrigerating and Air Conditioning engineers.
 2. AABC -Associated Air Balance Controls.
 3. AMCA -Air Moving and Conditioning Association.
 4. ADC -Air Diffuser Council.
 5. NEMA -National Electrical Manufacturers' Association.
 6. ANSI -American National Standards Institute.
 7. ASME -American Society of Mechanical Engineers.
 8. ASTM -American Society for Testing and Materials.

9. EPA -Environmental Protection Agency
10. NFPA -National Fire Protection Association.
11. NFPA 101 -Life Safely Code
12. NFPA 70 -National Electrical Code
13. NFPA 72 -National Fire Alarm Code
14. ARI -Air-Conditioning and Refrigeration Institute.
15. UL -Underwriters' Laboratories, Inc.
16. OSHA -Occupational Safety and Health Administration Regulations
17. All New York State and local codes

1.05 PERMITS, FEES ANP INSPECTIONS

- A. The contractor shall give all necessary notices, obtain all permits, and pay for all government, state sales taxes and applicable fees. The contractor shall file all drawings, complete all documents and obtain all necessary approvals from the proper authorities or agency having jurisdiction. Obtain all required certificates of inspection covering work. The contractor shall see that all required inspections and tests are made and shall cooperate to make these tests as thorough and as readily made as possible.

1.06 MATERIALS AND WORKMANSHIP

- A. Refer to Section 01 4000 -Quality Requirements for additional requirements.
- B. All materials and apparatus required for the work, except as otherwise specified, shall be new and of first-class quality. It shall be furnished, delivered, erected, connected, finished in every detail and so selected and arranged as to it's properly into the building spaces. Where no specific kind or quality material is given, a first-class standard article as accepted by the engineer shall be furnished.
- C. All equipment and materials shall be specification grade and bear the underwriter's label. No substitute or alternate equipment, material, etc. Will be considered for this project.
- D. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The engineer/owner reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or in a unserviceable manner. The contractor shall replace rejected work in a satisfactory manner at no extra cost to the owner.

1.07 GUARANTEE AND SERVICE

- A. The contractor shall. Guarantee all workmanship and materials for a period of two year from the date of acceptance of the installation. In addition, the contractor shall Provide, free of charge, one year 's maintenance guarantee on maintained service and adjustment of all equipment in this contract.

1.08 RECORD DRAWINGS

- A. Refer to Section 01 7800 -Closeout Submittals for additional requirements.
- B. Maintain, at the job site, a set of drawings indicating all changes in location of the equipment, devices, etc. From the original layout. Clearly mark in red all changes on the drawings. At the completion of the project the contractor shall turn over the record drawings to the engineer/owner.

1.09 COORDINATION

- A. All work shall be carried out in conjunction with other trades and full cooperation shall be given in order that all work may proceed with a minimum of delay and interference.

1.10 SHOP DRAWING

- A. Refer to Section 01 3000 -Administrative Requirements for additional requirements.
 1. Prior to delivery to the work area, but well in advance of requirements necessary to allow engineer ample time for review, contractor shall submit for approval, in PDF format of each shop drawing. Indicate on each submission:
 - a. Location
 - b. Architect/Engineers names
 - c. Item identification/description
 - d. Approval stamp of prime contractor
 - e. All shop drawings and coordination drawings shall include locations and sizes of existing equipment along with new work. Drawings and shall include locations and sizes of existing

equipment along with new work. Drawings shall indicate locations of hangers, supports, expansion joints, guides, anchors and anchor loads. Submit shop drawings for the following

- 1) Piping.
- 2) Pipe insulation.
- 3) Duct insulation.
- 4) Valves
- 5) Ductwork layout, coordination drawings, sheet metal standards and details
- 6) Air outlets (exhaust grilles)
- 7) Air and piping balancing reports
- 8) Heating element covers
- 9) Fans
- 10) Dielectric fittings.
- 11) Through-penetration firestop assemblies.
- 12) Design Calculations: Signed and sealed by a qualified professional engineer,
- 13) licensed in the state where the work is being performed for selecting seismic
- 14) restraints
- 15) Testing.
- 16) Controls

1.11 OPERATING INSTRUCTIONS

- A. Refer to Section 01 7800 -Closeout Submittals for submittal and additional requirements.
- B. The contractor shall furnish to the Owner and engineer instructions for operating and maintaining all systems and equipment.
 1. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions
- C. The contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this division.
- D. An authorized manufacturer's representative shall attest in writing that his equipment has been properly installed prior to startup. These letters will be bound into operating and maintenance books.

1.12 MANUFACTURER'S INSTRUCTION

- A. Install all equipment in accordance with manufacturer's instructions or requirements for proper operation and maintenance.

1.13 CUTTING, PATCHING, REPAIRING AND PAINTING

- A. Refer to Section 01 7000 Execution for additional requirements.
- B. The general contractor shall perform all cutting, patching, repairing and painting for all electrical items and equipment called for under this contract.

1.14 TEMPORARY FACILITIES AND CONTROLS

- A. Refer to Section 01 5000 -Temporary Facilities and Controls for additional requirements.

1.15 DRAWING AND INTENT

- A. Drawings are intended as working drawings for general layout of the various items of equipment. However Layout of accessories, specialties, equipment and piping systems are diagrammatic unless specifically dimensioned, and do not necessarily indicate every required valve, fittings, elbow, pipe, transitions, trap, junction or pull box, offsets or similar items required for the installation to be complete.

1.16 CONTINUITY OF EXISTING SYSTEM;

- A. Maintain continuity of the existing vent, waste, soil, hot and cold water systems to the areas not affected by the alteration.

1.17 INTERRUPTION OF SERVICE

- A. Contractor shall request shut down of service for all mechanical and electrical systems.
- B. Contractor shall coordinate with Owner's Representative. All shut downs shall be scheduled by the Owner's Representative.

1.18 MEASUREMENTS

- A. All measurements taken at the building shall take precedence over scale dimensions. Every part of the plans shall be fitted to the actual conditions at the building. If there is a conflict with the scale dimensions. Contact architect and/or engineer for direction/clarification.

1.19 PROTECTION OF EQUIPMENT MATERIALS AND FIXTURES

- A. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury. At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

1.20 SCAFFOLDING, RIGGING AND HOISTING:

- A. Unless otherwise specified, contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for the erection and delivery into the premises of any equipment and apparatus furnished. This will apply to any equipment that is being removed from the premises.

1.21 HOUSEKEEPING

- A. This contractor shall be responsible for keeping stock of materials and equipment stored on premises in a tidy and orderly manner and, at all times, keep the premises free from accumulation of waste material or rubbish caused by their employees at work. He shall remove his rubbish and surplus materials from the job site and shall have the premises and their work in a clean and well maintained condition.

1.22 QUIET OPERATION

- A. All work shall operate under all conditions of load without any sound or vibration which is offensive in the opinion of the engineer. In the case of the moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoying inside given room, will be considered unacceptable by the engineer and shall be remedied in approved manner by the contractor at their own expense.

1.23 ACCESSIBILITY

- A. Place valves, unions, Drains, and items requiring maintenance, adjustment, or repair, in accessible locations. Coordinate final location of access panels with architect.

1.24 OWNER'S INSTRUCTIONS AND SYSTEM OPERATION

- A. Refer to Section 01 7900 -Demonstration and Training

1.25 AT THE TIME OF THE JOB'S ACCEPTANCE BY THE OWNER, CONTRACTOR SHALL FURNISH ONE COMPLETE SET OF APPROVED CERTIFIED DRAWINGS TO THE OWNER. IN ADDITION THE CONTRACTOR SHALL FURNISH MAINTENANCE AND OPERATING INSTRUCTIONS FOR ALL EQUIPMENT. THE INSTRUCTIONS SHALL BE WRITTEN IN LAYMAN'S TERMS AND SHALL BE INSERTED IN VINYL-COVERED THREE RING BINDER. THE INFORMATION IN THE BINDER SHALL BE FIRST SENT TO AND APPROVED BY THE ARCHITECT/ENGINEER BEFORE TURNING OVER TO THE OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All materials and equipment provided under this section shall be new, first grade, best of their respective kinds and in no way shall they be less than the quality and intent set forth under this section. They shall meet the requirements of all standards set up to govern the manufacturer of HVAC materials and comply with all applicable codes and standards.

PART 3 -EXECUTION

3.01 EXAMINATION

- A. Verify that existing conditions are acceptable prior to starting installations.
- B. Preinstallation Testing: Test substrate for existing fire alarms system prior to modifications.

3.02 PREPARATION

- A. Protection of In-Place Conditions: Prior to removals and during new work protect existing, floor, walls, ceilings, equipment and furnishings.
- B. Removal: Removing existing equipment, ductwork, devices, wiring as required to install new work.

- C. Measure indicated mounting heights to bottom of unit, devices, registers, etc. for suspended items and to center of unit for wall-mounting items.
- D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

3.03 INSTALLATION GENERAL

- A. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- B. Right of Way: Give to piping systems installed at a required slope.
- C. All work, materials and manner of installing same shall be in strict accordance with the latest code.
- D. Unless otherwise indicated all wiring exposed in finished and occupied areas shall be wire mold (2000 series or equal). Conduit shall be installed within new stud partitions, mechanical room, above ceilings in rigid galvanized steel conduit (RGS) shall be used for wiring in the following locations:
 - 1. Exposed to moisture or mechanical damage.
- E. Electrical metallic tubing (EMT) shall be used for concealed and exposed wiring in dry locations as follows:
 - 1. Interior receptacle and power branch circuit wiring
- F. All conduit shall be installed in parallel and perpendicular to the building lines. All conduit shall be supported using cadmium plated conduit straps and hangers. Separate conduit systems shall be installed for normal, and low voltage power.
- G. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings or within these specifications.
- H. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation systems herein specified.
- I. Electrical circuit connections to isolated equipment shall be looped to allow free motion of isolated equipment.
- J. The contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in this Specification. Building includes, but is not limited to, slabs, beams, columns, studs and walls.
- K. Isolation mounting deflection shall be minimum as specified or scheduled on drawings.
- L. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.

3.04 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

3.05 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such 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.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

3.06 ADJUSTING

- A. Repair or remove and replace defective work, as directed by (Architect/Owner) upon completion of installation.
- B. Adjust moving or operating parts to function smoothly.

3.07 CLEANING AND PROTECTING

- A. Thoroughly clean all electrical equipment, devices and enclosures upon completion of all work. Repaint any equipment whose finish is damaged or rusted. Match manufacturer's original finish.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Properly and completely protect against all damage, all apparatus, equipment, etc., included in this contract. The contractor will be held responsible for any damage to furnished apparatus, equipment, etc., until final acceptance.
- D. The contractor shall take whatever means necessary and/or required to protect owner's property within the working areas from dust, debris and other matter generated by the work. No work shall commence in areas where protection is required until approval has been given to the contractor by the owner.

END OF SECTION

**SECTION 23 0500
COMMON WORK RESULTS FOR HVAC**

PART 1 - GENERAL

1.1 STIPULATIONS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.2 EXECUTION OF THE WORK

- A. These specifications call out certain duties of the HVAC Contractor and any Subcontractors. They are not intended as a material list of items required by the Contract. Any reference in these specifications and on the accompanying drawings to the Contractor, Mechanical Contractor, ATC Contractor, Mechanical HVAC Subcontractor, Subcontractor or abbreviation "M.C.", shall be construed to mean the Contractor responsible for all mechanical construction (Division 23) work for this project.
- B. This division of the specifications covers the HVAC systems of the project. It includes work performed by the mechanical trades as well as trades not normally considered as mechanical trades.
- C. Provide all items and work indicated on the Drawings and all items and work called for in this division of the specifications in accordance with the conditions of Contract (Division 01 General Requirements Documents). This includes all incidentals, equipment, appliances services, hoisting, scaffolding, supports, tools supervision, labor consumable items, fees licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to provide fully operable systems.
- D. Comply with all provisions of the Contract Documents including the General Conditions, and Division 01 General Requirements of the specifications.
- E. Certain terms such as "shall, provide, install, complete, start-up" are not used in some parts of these specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- F. Examine and compare the HVAC Drawings with these specifications, and report any discrepancies between them to the Architect/Engineer and obtain from him written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in said bid.
- G. Examine and compare the HVAC Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the
 - a. Architect/Engineer and obtain from him written instructions for changes necessary in the work.
 - b. At time of bid, the most stringent requirements must be included in said bid.
- H. Install and coordinate the HVAC work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Architect/Engineer. All changes required in the work of the Contractor, caused by his neglect to do so, shall be made by him at his own expense.
- I. It is the intent of the Drawings and Specifications to provide a complete code compliant workable system ready for the Owner's operation. Any item not specifically shown on the Drawings or called for in the Specifications, but normally required to conform with the intent, are to be considered a part of the Contract.
- J. These specifications are basically equipment, installation, and performance Specifications. Some installation details are indicated on the Drawings. Where these differ from the Specifications, apply the more stringent at time of bid. Upon award of bid, contact Architect/Engineer for definite instructions.

- K. All materials furnished by the Contractor shall be new and unused (temporary services are excluded) and free from defects.
- L. All products and materials shall be new, clean, free of defects and free of damage and corrosion.
- M. The exclusion from, or limitation in, the symbolism used on the Drawings or the language used in the Specifications for HVAC work shall not be interpreted as a reason for omitting the accessories necessary to complete any required system or item of equipment.
- N. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.
- O. All items of equipment or material shall be the product of one manufacturer throughout. Multiple manufacturers will not be permitted.
- P. Receive, inspect, store and install Owner-furnished equipment where Owner furnished equipment is supplied.

1.3 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to insure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. No items foreign to the electrical system shall be run in the dedicated space of the electrical equipment. Dedicated space shall be defined as the width and depth of the equipment from the floor to the bottom of the structural ceiling. Foreign systems include but are not limited to piping, sprinklers, drip trays, etc. Contractor shall be responsible to coordinate the locations of the dedicated spaces with electrical and other trades as required.
- D. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- E. Wherever work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- F. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. The locations of piping, control panels, and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in consequence of increase or reduction of the number of outlets, or in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- H. The Drawings show only the general run of piping and approximate location of termination. Any significant changes in location of routing, necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.

- I. Wherever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work shall be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.
- J. Contractor shall furnish services of an experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.
- K. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- L. Where service connections are required, to equipment provided by the Owner or by other trades, this Contractor shall verify the exact requirements for these connections prior to ordering any materials or laying out any work. Where there is a discrepancy between the equipment being furnished and that shown on the Contract Drawings, the Contractor shall notify the Architect/Engineer for direction. Failure to comply with this coordination shall not constitute a reason for extra monies for equipment ordered or installed. Restocking charges will not be paid.

1.4 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.5 SUMMARY

- A. This section includes the general requirements that apply to the Mechanical and HVAC Contractor. Fire Protection and the Controls Contractor or Sub-Contractor.
- B. The following work is specified under other Divisions, unless otherwise noted or specified hereinafter:
 - 1. Roof, Waterproofing and Insulation Division 07.
 - 2. Plumbing, Division 22.
 - 3. Electrical, Division 26.
 - 4. Installation of starters, contactors, thermal overload switches and remote push buttons, and connection of power wiring to motors, Division 26.

1.6 INTENT

- A. Requirements specified herein shall govern applicable portions of Heating, Ventilation and Air Conditioning.
- B. It is the intent of this specification and accompanying drawings to describe and indicate the general manufacture, erection and installation of the equipment and connection to same specified herein and shown on the drawings. It is not intended that the specifications and drawings describe and indicate each piece of equipment required for installation, for where items are intended or required for satisfactory installation and are considered to be the accepted practice of the trade, they shall be considered to be both specified and indicated. Drawings are diagrammatic in nature; for piping systems; water piping is tapped off the bottom of the pipe and steam and steam condensate piping is tapped off the top of the pipe; provide all tees, elbows and swing joints as required for hookup to coils or branch piping as required for this work whether they are indicated on the drawings or not.

- C. It shall be understood that the Contractor as hereinafter mentioned shall be the Mechanical Contractor unless specifically noted otherwise.
- D. The Contractor shall furnish all plant, labor and material necessary for the complete and satisfactory installation of all Mechanical work for this contract.
- E. The Contractor shall assume the entire responsibility for the materials, workmanship and satisfactory operation of the various mechanical systems, and other work as specified herein and/or as shown on the drawings.
- F. The Contractor shall schedule and coordinate all work in close cooperation with all trades working on this project.

1.7 DEFINITIONS

- A. Following definition of terms and expressions used in this section are in addition to listing given in Supplementary Conditions:
 - 1. "Provide" shall mean "furnish and install" unless otherwise indicated.
 - 2. "Herein" shall mean the contents of a particular section where this term appears.
 - 3. "Indicated" shall mean "Indicated on contract drawings".
 - 4. 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, crawl spaces, and tunnels.
 - 5. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
 - 6. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
 - 7. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
 - 8. 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.
 - 9. The following are industry abbreviations for plastic materials:
 - a. ABS: Acrylonitrile-butadiene-styrene plastic
 - b. CPVC: Chlorinated polyvinyl chloride plastic
 - c. NP: Nylon plastic
 - d. PE: Polyethylene plastic
 - e. PVC: Polyvinyl chloride plastic

1.8 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall be responsible for establishing grades and elevations, and checking of all interferences, and shall verify all dimensions and locations in the field.
- B. Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, ducts, piping and approximate sizes and locations of equipment outlets. Mechanical trades shall follow these drawings in layout of their work, consult general construction, structural and electrical drawings to familiarize themselves with all conditions affecting their work, and shall verify spaces in which their work will be installed.
- C. The Contractor shall verify with the A/E before bidding any item of piping or piping arrangement which may be incomplete, incorrect or indefinite. After contract is let, the A/E's decision shall be final.

- D. All trades shall cooperate and confer with each other as to locations of their materials and equipment before erecting work, so as to avoid interference as much as possible, and in such a manner that will in no way retard progress of construction. In instances where interferences develop, the contractor shall relocate the work as required by the A/E regardless of which work was installed first.
- E. Where job conditions require reasonable changes to indicate locations and arrangement, make such changes without extra cost to Owner. This is not to be construed to permit redesigning of the various systems.
- F. Additional and supplementary drawings may, from time to time, be furnished, and the same, when made, are to constitute a part of the original contract. These drawings will be made to clarify the contract drawings and will not depart materially therefrom.
- G. The A/E specifically reserves the right, up to the time of roughing-in, to exactly define the position of the equipment to be installed and connected to and arrangement of these connections.
- H. Special attention is called to the contract drawings and specifications involving general construction, electrical work and details thereon. Bidders are notified to carefully scrutinize these documents for the details affecting the performance of the mechanical trades.

1.9 SCHEDULE OF WORK

- A. The Contractor shall schedule all of his work to conform to the Job Progress Schedule as submitted by the General Contractor or Construction Manager, and approved by the A/E and school district.

1.10 PREMIUM TIME WORK

- A. The following work shall be performed at night or weekends other than holiday weekends, as directed and coordinated with the Owner:
 - 1. Tie connections to all existing systems.

1.11 PROGRESS OF WORK

- A. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

1.12 DELIVERY, STORAGE, PROTECTION AND HANDLING

- A. Deliver, store, protect and handle all products and materials in a manner which will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the Architect/Engineer.
- B. Delivery of Materials: Delivery materials in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessible for inspection by the Architect/Engineer until installed. Store all items, susceptible to moisture damage, in dry, heated spaces.
- D. Protect materials and equipment according to the manufacturer's instruction. Protection shall include damage due to fire, water, rust, oxidation, sunlight (for UV sensitive materials), breakage of UV lights, etc.

- E. Following is in addition to Protection of Work and Property, General Requirements:
1. Responsibility for care and protection of mechanical work rests with the Contractor until it has been tested and accepted.
 2. After delivery, before, during and after installation, protect equipment and materials against theft, injury and damage from all causes.
 3. Protective covers, skids, plugs, caps and coating shall be provided to protect equipment materials from damage during construction.
 4. All equipment and material shall be stored under cover and off the ground.
 5. For outdoor storage, protective covers of sheet plastic shall be provided. Covers shall be of gauge required for the area involved and shall be reinforced to withstand wind, rain, sleet and snow. Equipment and material shall be set on skids or platforms of sufficient height to avoid deterioration from spattering and ground water.
 6. Plug open ends of pipes when work is stopped to prevent debris from entering the pipes.
 7. Coat polished or plated metal parts with Vaseline immediately after installation.
- F. The Contractor shall receive, properly house, handle, hoist, and deliver to proper location, equipment and other materials required for the contract.
- G. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

1.13 INTERFERENCE WITH THE OWNER'S NORMAL OPERATION

- A. All work shall be performed in such a manner as not to interfere with the normal work operations in adjacent spaces or buildings.
- B. In no way shall the Contractor:
1. Block or restrict the means of egress for adjacent spaces.
 2. Decrease the fire rating of walls, partitions, ceilings, doors or combination thereof of adjacent spaces or of means of egress.
 3. Interrupt safety systems or in any way adversely affect the safety of people or materials in adjacent spaces.
- C. The Contractor shall provide acoustical isolation of the work area via temporary doors, partitions, etc., adequate to allow normal work functions.
- D. The Contractor shall provide exhaust fans, dust proof temporary partitions and any containment measure required to prevent dirt, dust, or fumes from reaching adjacent work spaces.
- E. All personal traffic and material delivery shall be routed so as to absolutely minimize travel through adjacent work area.

1.14 VISIT TO SITE

- A. The Contractor shall visit the site and thoroughly acquaint himself with all existing conditions relative to type and source of service available. He shall verify location and extent of these services and consider routing, interferences and excavation required by the contract and any and all other difficulties that may be encountered.
- B. Submission of a proposal shall be construed as evidence that such an examination has been made.
- C. Failure to visit the site shall not constitute sufficient reason to warrant claims for extra monies for difficulties not apparent in the contract documents.

1.15 MANNING THE PROJECT

- A. The Contractor shall, upon initiation of construction, keep a suitable force of men on the site at all times in order to lace all sleeves, inserts, outlet boxes, fixtures and provide all other openings as are required for the satisfactory installation of equipment.

1.16 FEES AND PERMITS

- A. The Contractor shall secure all permits and pay all fees, required by local and state governing bodies, necessary to complete his phase of the construction. Failure to investigate all applicable payments before the bid submission shall not constitute grounds for additional monies from the Owner. The Owner shall be furnished with all certificates of approval.
- B. The Contractor shall provide insurance and bonding as required by the Building Owner or as stated in the General Conditions.

1.17 CODES AND STANDARDS

- A. The design, construction and installation of all materials and equipment shall be in compliance with the latest edition of all national, state and local codes or standards.
- B. The codes and standards referred to are minimum standards. Where the requirements of these specifications and the accompanying drawings exceed those of the codes and standards, the drawings and specifications shall be followed.

1.18 BASIS OF DESIGN

- A. The layout is based upon the use of particular items of equipment, identified by manufacturer's make and model number. Dimensions, arrangements and service connections required for these particular items have been considered in making the layout. The contractor may use the equipment of any manufacturer whose name is approved for substitution on that item of equipment after he had ascertained that all provisions of MATERIAL SUBSTITUTIONS will be complied with and that all required service connections will be made at no additional cost to the Owner.
- B. Manufacturers are listed for a quality assurance level only. Although a manufacturer is listed does not constitute compliance with the specification size, weight, functionality, capacity, noise, or performance levels. It is this contractor's responsibility to assure the proposed manufacturer has complete compliance with the Contract Documents, **prior to bidding**.
- C. Except where dimensions are shown, the drawings are diagrammatic and shall not be scaled. Exact location of fixtures, apparatus, duct work and piping shall be determined by dimensions on the site. Contractor shall refer to architectural plans and details for exact dimensions.
- D. The drawings indicate the locations of apparatus and piping shall be followed as closely as possible. If before the installation it is found necessary to change the location to accommodate conditions at the building, such changes shall be made at no additional cost to the Owner, and as approved by the Architect/Engineer.
- E. Equipment requiring operation, service or maintenance during the life of the system shall be made easily accessible.
- F. Ductwork or piping shall not be run within 48" of switchboards, panelboards or motor control centers.
- G. No piping to other HVAC items shall be run in the dedicated equipment space as defined in the N.E.C. (NFPA 70). The dedicated equipment space is the space equal to the width and depth of the equipment and extending from the floor to a height of 6ft. Refer to the National Electrical Code section 11 0. 26 (E)

for further information. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone. It is this contractor's responsibility to coordinate with the electrical contractor for all phases of this project.

- H. Use of open-flame devices in work shall be accompanied by fire extinguishing apparatus within 25 feet of work location. All work shall be done in accordance with the general construction requirements and fire watch procedures.

1.19 QUALITY OF MATERIALS

- A. Where a specific model and manufacturer of equipment is specified, the Contractor shall provide what is specified without substitution. Where specified as "or approved equal", the Contractor may substitute equipment except that the burden is upon the Bidder to prove such equality. If the Bidder elects to prove such equality, he must request the Architect's approval in writing to substitute such item for the specified item, stating the cost difference involved with supporting data, and samples, if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty and cost.
- B. Where a specific model of equipment is specified along with an approval equal manufacturer, no substitution will be allowed. The Contractor shall submit one of the manufacturers listed.
- C. Final approval of competitive equipment is reserved by the Engineer when, in the Engineer's opinion, the equipment does not correspond to that specified.

1.20 MATERIAL SUBSTITUTIONS

- A. Material substitutions shall be allowed only where "or equivalent" is stated.
- B. Material substitution submittals shall, include complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance, test data and evidence that the proposed manufacturer or his established representative maintains a qualified service organization including spare parts and is available for competent service on short notice.
- C. Each bidder by submitting his bid represents that the proposal of such article, device, product, material, fixture, form or type of construction by name, make, catalog number of manufacturer which varies with the equipment specified shall be incorporated into the project without claims against the Owner for additional cost. The bidder shall be responsible for all additional costs incurred by others due to the substitutions.
- D. The Architect/Engineer shall have the final approval of all submitted substitutions.
- E. Manufacturers are listed for a quality assurance level only. Although a manufacturer is listed does not constitute compliance with the specification size, weight, functionality, capacity, noise, or performance levels. It is this contractor's responsibility to assure the proposed manufacturer has complete compliance with the Contract Documents, **prior to bidding**.

1.21 SUBMITTALS

- A. Product Data, Shop Drawings: Submit for approval by the authority having jurisdiction and the Owner's insurance underwriter.
- B. Product Shop Drawing Submittal List:
 - 1. Within thirty (30) days after date of execution of the Owner/Contractor Agreement, submit for review and acceptance, a list of all material and equipment manufacturers whose products are proposed, as well as names of all subcontractors whom this trade proposes to employ.

2. Any requests for substitutions of equipment or materials must be submitted and returned prior to submitting the Submittal List. Only specified or accepted manufacturers or suppliers shall appear on the Submittal List.
 3. The complete Submittal List must be reviewed and accepted by the Architect/Engineer prior to submittal of Shop Drawings. No Shop Drawings will be processed without an accepted Submittal List.
 4. The Submittal List shall include all material, systems, and equipment specified herein.
- C. Approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- D. All submittals shall bear a stamp or notation indicating that the Contractor has reviewed and approved the submittals.
- E. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and shall clearly identify equipment being submitted.
- F. Submittals shall be marked to show specification reference including the section and paragraph numbers.
- G. Submit each section separately and include the following:
1. Information which confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Submittals on all pumps and fans shall be complete with performance curves marked with the design points.
 3. Submittals on electrical equipment shall be complete with all power and control wiring diagrams.
 4. Vibration isolators shall include operating weight and load distribution at each mounting point.
- H. The Contractor agrees that failure of manufacturer's submittal to conform to the above will result in a manufacturer's disqualification on this project.
- I. Submit samples as directed of items called for in the specifications; samples of the materials which the manufacturer will actually ship shall be submitted for approval after award of contract and properly labeled on this project.

1.22 ELECTRICAL

A. Power Wiring

1. For the purpose of this specification, power wiring shall be defined as follows:
 - a. All wiring from the power source panelboards (or switchboard) to the disconnect switch to the equipment, and final connection to the equipment.
 - b. All wiring to control panels as indicated in the Electrical and Mechanical Contract Documents. (All control panels not indicated on the Electrical Contract Documents as receiving power shall do so by jumpers from other control panels, this wiring shall be considered control wiring as defined below).
2. All power wiring from the power source to the above noted switches and wiring from these switches to the equipment, including final connection to same, shall be provided under Division 26, Electrical.

B. Control Wiring

1. All other wiring required, whether line voltage or low voltage, internal or external to provide for the operation of the equipment shall be considered as control wiring. This shall include power wiring from transformers serving dampers at exhaust fans; wire to damper and fan end switch to starter.
 2. All control wiring throughout the building, including wiring installed at piping, in ductwork, or as specified shall be provided under this Division.
- C. The Contractor shall furnish all motors, mounts, motor starters and remote mounted push-button controls for all electrically operated equipment furnished as part of the contract. The Contractor shall furnish all safety disconnects. The Contractor shall furnish all speed control switches for all multi-speed motors. All motors shall have copper windings. (Aluminum windings will not be acceptable).
- D. This Contractor is completely responsible for the coordination with all other trades as to the correct voltage for all equipment requiring power. Equipment and or changes required to meet the project voltages will be the responsibility of this contractor.
- E. All push-button switches and starters shall be mounted under Division 26, Electrical.
- F. The Contractor shall provide all controls and control devices, all mounting for controls and all other electrical devices as specified and necessary for the complete installation and satisfactory operation of all electrically operated controls furnished under this Division.
- G. All locally mounted starters shall be furnished under Division 23, except as noted below. Where indicated hereinafter, starters shall be furnished as an integral part of equipment. Starters furnished in motor control centers shall be provided in Division 26, Electrical (refer to Electrical Drawings). Control of starters in motor control centers feeding mechanical equipment shall be provided under Division 23.
- H. Starting equipment of each motor shall be of the proper voltage and HP rated for the motor it is to serve. All starters shall be of the enclosed type; NEMA Type 1, for general-purpose enclosures; NEMA Type 4 for watertight enclosures, and NEMA Type 12 for the dust-tight enclosures. Location of motor shall determine type of enclosure to be used.
- I. Manual motor starters for single-phase motors shall be one or two poles as required, consisting of a snap switch combined with a thermal overload device. It shall be impossible for the switch to be held in a closed position under a sustained motor overload. For resetting the overload mechanism, the switch lever shall be of a design where it has to be moved to the "off" position. Starter shall be enclosed in type of enclosure for area in which it is to be used.
- J. Magnetic starters for 3-phase motors shall be furnished with 110 volt holding coils, 120 volt fused transformers, normally open and normally closed auxiliary contact and overload relay heater elements in all three phases. Provide hand/off/auto selector switch along with running status lights and external reset button.
- K. Locate starters and associated starter controls in accessible locations wherever possible. Location of starters for roof mounted exhaust fans and mechanical equipment above ceilings shall be located at accessible locations above ceiling. Locations shall be coordinated with furniture and equipment layouts for the optimum accessible location for installation and maintenance means.
- L. The Contractor shall be completely responsible for the coordination of automatic temperature control system with control interlocks between various items of mechanical equipment.

1.23 SCAFFOLDING

- A. The Contractor shall furnish and install scaffolding, ladders and runways required in connection with his work.

1.24 TEMPORARY OPENINGS

- A. Temporary openings not indicated, which may be required for purpose of bringing equipment into building, shall be as approved. General Contractor will perform work of providing and maintaining openings, and of restoring structure; but Contractor for whom temporary openings are provided shall bear costs thereof, and for restoring structure. Ample notice shall be given of size and location of such openings by Contractor requiring same.
- B. Holes provided in General Construction work to permit installation of lines for temporary mechanical services will, after removal of such lines, be patched as specified under Division 01.

1.25 TEMPORARY SERVICE

- A. Temporary services are specified under Division 01, "General Requirements".

1.26 CUTTING AND PATCHING

- A. The Contractor shall provide all floor and wall cuts as required for ductwork and piping penetrations of existing construction.
- B. No cutting of bearing walls, beams, etc., shall be done without the approval of the Architect. All patching and finishing, etc., shall match the surroundings. All cutting and patching shall be done by workmen skilled in the trades and in the employ of the General Contractor for the project. All cutting shall be done with saw type edges to give a neat and workmanlike appearance. All pipe holes shall be core drilled unless specified otherwise.
- C. Should it be necessary to do any cutting and patching due to the failure of this Contractor to give proper information to the General Contractor, it shall be done at the expense of the Mechanical Contractor.

1.27 PAINTING AND FINISHING

- A. Except as specified herein, the finished painting of Mechanical Work within the building and on the roof shall be as specified under Division 09.
- B. All mechanical equipment shall have a factory-applied prime and finish coat of paint. Galvanized surfaces shall be considered as finished surfaces for equipment rooms and items concealed from view. Plastic products shall be acceptable without a finish coat of paint. All items of equipment marred or rusted, even though factory finished, shall be repainted; steel angles and steel supports for ductwork, piping or miscellaneous equipment shall have a prime coat of paint before installation.
- C. General Contractor to paint all exposed piping, equipment, and trim that does not have a factory applied finish. Refer to Division 09 "Painting" for paint materials, surface preparation and application of paint. Paint shall be semi-gloss, acrylic-enamel paint. Coat components with two (2) coats of finish paint over two (2) coats of rust inhibitive metal primer or approved equivalent based on component type.

1.28 CONCRETE WORK

- A. Concrete work shall be in accordance with Division 03.

1.29 SUSPENSION SUPPORT FOR PIPES & EQUIPMENT

- A. All pipes and equipment that are suspended shall be connected directly to the building steel. Where hangers are required between building steel points, supplementary steel members shall be added by the Contractor as required to adequately support the load.
- B. Pipes shall not be supported from other pipes, ducts, or equipment.
- C. Hangers from joists shall be attached at the panel points. Pipes with weights of 50 pound per foot (total for single or multiple runs) routed parallel with bar joists shall be supported from a minimum of 3 joists at each hanger point (channel members between joists).

1.30 ACCESS PANELS – BUILDING

- A. Access plates and valves located concealed in walls or above ceilings, and are otherwise inaccessible shall be furnished with an access panel for each location. A hinged inconspicuous type access panel complete with frame, of such size and so located as to provide proper access for service and maintenance.
- B. The minimum size of each access panel shall be 18" x 18" unless physical restraints require a smaller door.
- C. Panels shall be furnished under this Division and installed under another Division of the Specification.
- D. When access panels or doors are installed in fire rated construction, they shall be fire rated to match the construction.

1.31 FIRESTOP PENETRATION PROTECTION SEALING SYSTEM

- A. Where pipes pass through fire partitions, firewalls, floors or ceilings, install a firestop that provides an effective barrier against the spread of fire, smoke, gases and water. Fire-stop material shall be packed tight, and completely fill clearances between pipe, sleeves and structure. All crack voids or holes (up to 4" diameter) shall be sealed using 3M brand Fire Barrier Caulk CP25 or putty 303 or an approved equal. Larger diameter or square holes, 3M system 7902, 7904, 7902R or 7904R or approved equal shall be in accordance with manufacturer's instructions.
- B. Fire-stopping material shall maintain its integrity while preventing the passage of flame, smoke, gases or water. Fire-stopping material shall be a one-part, intumescent elastomer noncombustible, noncorrosive and compatible with synthetic cable jackets as defined by ASTM E814 (UL 1479); and in addition for insulation materials, melting points shall be a minimum of 1700 degrees F for one-hour protection and 1850 degrees F for 2-hour protection.

1.32 RECORD DRAWINGS

- A. The Contractor shall furnish record as-built drawings to the Architect at completion and acceptance of the job. Transparencies of the original drawings with corrections shall be submitted as specified in the General Requirements.
- B. Record all changes from installation originally indicated. Record final location of underground lines by depth from finished grade and by offset distances in feet and tenths to surface improvement such as buildings, curb, or edges of walks. Where work appears on two or more drawings, Contractor shall mark changes on all drawings. Contractor shall mark changes on all drawings. At completion, furnish the above required transparencies to the A/E for approval and record. Drawings shall be certified to be record of work installed and signed by the Contractor. Work shall not be accepted until such drawings have been delivered to the A/E.

1.33 GUARANTEE

- A. In addition to the requirements stated in the specifications, the Contractor must guarantee all equipment, materials, and appurtenances installed by him to be free from all defects for a period of one year from date of final acceptance.
- B. Upon written notice from the A/E, the Contractor shall promptly correct all defects without additional cost to the Owner. This Contractor shall adjust each part of the entire installation for proper working order. Reports are to be submitted to the A/E and adjustments repeated until the entire system is satisfactory. This Contractor must make good, at his own expense, any defects in materials or workmanship that may appear.

1.34 CLEAN UP

- A. The Contractor shall be held responsible for the general clean up of all areas affected by the work in the Contract. All rubbish and accumulative material shall be removed from the premises and the premises left "broom clean" upon completion.
- B. All stickers, rust, stains, labels and temporary covers shall be removed before final acceptance.
- C. Foreign matter shall be blown, vacuumed or flushed out of piping, pumps, fans, motors, devices, switches, panels, duct work and equipment.
- D. Identification plates on equipment shall be free of excess paint and shall be polished.

1.35 OPERATION AND MAINTENANCE MANUALS

- A. Submit to the Engineer for approval three manuals covering details of operation maintenance for all apparatus requiring service. The Contractor shall arrange formal instruction sessions by competent representatives of the manufacturer for the Owner's operating personnel to cover the following:
 - 1. Service telephone number, fax number, websites, email addresses, business and service addresses and mobile telephone numbers of the installing contractor, and manufacturer and supplier and parts counters of pumps, fans, air handling units, condensate return units, chillers, CV boxes, fan coil units and other components comprising the systems.
 - 2. Manufacturer's operating and maintenance manuals, including detailed parts lists with numbers, power and control wiring diagrams for each piece of equipment and accessory requiring services or maintenance, the guarantee period and the name, address and phone number of the nearest sales and service organization for each item. Both on print and CD's (min 3 copies) form (PDF/MS Word).
 - 3. Cross out options that are not used on equipment sheets, highlight options selected.
 - 4. Step-by-step procedure for starting, stopping, setpoint adjustment, monitoring and alarm enunciation for each system.
 - 5. Copies of inspection certificates provided by the City, County, State and insurance companies.
 - 6. Provide separate Operation and Maintenance Manuals covering the FMCS and in compliance with this section.
 - 7. Routine maintenance procedures and scheduling for all mechanical equipment.
- B. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of the manuals.

1.36 INSTRUCTION TO OPERATIONAL PERSONNEL

- A. Furnish the services of competent instructors to give full instruction to the designated Facilities personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system on the Contract Documents. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work.
- B. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. Provide 4 man-hours of instruction for each: chemical treatment/glycol systems, pumps, exhaust and intake fans, heat exchangers, CV boxes, fan coil units, condensate return units; 8 man-hours for the AH-1 air handling unit and components including the UV system, 24 man hours for the CH-1 chiller; and 40 man hours instruction for the FMCS (operational, maintenance, programming instruction for trend logging and charting, setpoint adjustment schemes, alarm functionality and other routine operational commands/functions) required by the Owner's personnel..
- C. Instruction shall cover routine maintenance, control and power wiring diagrams and component analysis, preventative maintenance and scheduling, starting and stopping, alarm resets, trend-logging, setpoint adjustment, emergency and normal shutdown/startup, alarm date stamping and all else required by the Owner for complete usage/maintenance/adjustment of equipment in their intended systems.
- D. Obtain written statements from the Owner's representative acknowledging satisfactory completion of each item of instructions.

PART 2 - PRODUCTS

2.1 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Acceptable Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Accepted substitute in accordance with Section 01 60 0.
 - 2. Sealing Elements: EPDM interlocking inks, shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
- B. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.2 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239 inch 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.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.3 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. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With hinge and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.4 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000 psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.

C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

3.2 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specification to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule
 2. Preparation of the Schedule of Values
 3. Installation and removal of temporary facilities and controls
 4. Delivery and processing of submittals
 5. Progress meetings
 6. Pre-installation conferences
 7. Project closeout activities
 8. Startup and adjustment of systems
 9. Project closeout activities
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into the work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

3.3 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequenced.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Number of Copies: Submit three opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned. Markup and retain one returned copy as a Project Record Drawing.
 3. Refer to individual Sections for Coordination Drawing requirements for work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

3.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

3.5 PROJECT MEETINGS

- A. General: Attend meetings and conferences at Project Site, unless otherwise indicated.
- B. Preconstruction Conference: Attend a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
- C. Pre-installation Conferences: Attend a pre-installation conference at Project Site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction Manager of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents
 - b. Deliveries
 - c. Review of mockups
 - d. Possible conflicts
 - e. Time schedules
 - f. Manufacturer's written recommendations
 - g. Acceptability of substrates
 - h. Temporary facilities and controls
 - i. Coordination with other work
 - j. Protection of construction and personnel
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Attend progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 1. Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 1. Interface requirements
 2. Status of submittals
 3. Off-site fabrication
 4. Site utilization
 5. Hazards and risks
 6. Progress cleaning
 7. Status of correction of deficient items
 8. Requests for interpretations (RFIs)
 9. Status of proposal requests
 10. Pending changes

11. Status of Change Orders
 12. Pending claims and disputes
 13. Documentation of information for payment requests
3. Minutes: Record the meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

3.6 EQUIPMENT LOCATIONS

- A. Equipment locations: All mechanical equipment shall be located to provide for manufacturer's recommended clearances, clearance for routine maintenance, clearance per code requirements and locations/clearances required for removal/replacement in the future.
 1. Manufacturer's recommended clearances shall include space for clearance for pumps (18" minimum around pumps), 30" clearance or complete access door swings, clearances for tube pulls (heat exchangers, etc.); locate piping to be clear of these locations.
 2. Provide minimum 36" clearance around heat exchangers and other pressure vessels; note this is a minimum requirement, provide excess wherever possible. Provide minimum 42" clearance from power panels per the latest edition NEC having jurisdiction; include requirements for piping and ductwork at such locations.
 3. Locate equipment in mechanical rooms to allow for future removal and replacement. Include heights to overhead piping where applicable. Wherever possible, clearances shall include removal/replacement as a whole entity without knock-down.
 4. Locate roof mounted equipment minimum 10' away from edges of roof. Where equipment is located closer, provide handrail system at roof edge as required per codes having jurisdiction. Maintain clearances from handrail system to power panels.

3.7 ACCEPTANCE TESTING

- A. An acceptance test of the HVAC system shall be performed by the Contractor in the presence of the Owner's representative and the Local Fire Marshal. Upon completion of the successful test, the Contractor shall so certify in writing to the Owner and General Contractor.
- B. The Contractor shall also utilize all sub-contractors such as balancing, piping, controls and commissioning agent, and other contractors such as electrical, plumbing, fire alarm and communications as required to perform this acceptance test.
- C. The acceptance test shall be performed to determine that the protective measures required as outlined in NFPA 90A and shall function when needed in order to restrict the spread of fire and smoke.
- D. The acceptance test shall include testing the HVAC system to determine its full functionability and in compliance with NFPA 90A and the sequence of operation. All controls and equipment shall be modulated throughout their entire ranges and adjustments shall be made for optimum performance.
 1. Portions of control or alarm systems are permitted to have standby power or other emergency modes of operation.
 2. The tests shall be performed to determine that the system operates under the standby power or emergency operation mode as well as under normal conditions.

3.8 CONNECTION TO EXISTING UTILITIES

- A. If connecting to an existing piping system (water, gas, steam, condensate, etc.). It shall be the responsibility of this contractor to verify the integrity of the existing piping system being connected. All applicable testing and acceptance will apply.
- B. Existing Pipe Testing: The contractor shall remove a section of piping at the point of connection between new and existing. The contractor shall determine the integrity of the existing piping after analysis of the piping section for tube wall thickness, scaling and corrosion. The analysis shall determine the ability for tie-in, pressure testing ability and remaining useful life. The contractor shall guarantee the piping integrity at the point of tie-in and subsequent acceptance. For existing piping not currently being used; the contractor shall pressure test in order to determine integrity and subsequent acceptance. Report all results in writing to the Architect/Engineer.

3.9 PIPING SYSTEMS – COMMON REQUIREMENTS

- A. 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: One piece, cast brass type with polished chrome plated finish.
 - c. Insulated Piping: One piece, stamped steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass type with polished chrome plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Cast brass type with polished chrome plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: Set screw.
 - h. Bare Piping in Unfinished Service Spaces: One piece, cast brass type with finish.
 - i. Bare Piping in Unfinished Service Spaces: One piece, stamped steel type with hinge.
 - j. Bare Piping in Equipment Rooms: One piece, cast brass type.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped steel type.
 - l. Bare Piping at Floor Penetrations in Equipment Rooms: One piece, floor plate type.
 - 2. Existing Piping: Use the following:
 - a. Chrome Plated Piping: Split casting, cast brass type with chrome plated finish.
 - b. Insulated Piping: Split plate, stamped steel type with hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast brass type with chrome plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split plate, stamped steel type with concealed hinge and spring clips.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass type with chrome plated finish.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split plate, stamped steel type with concealed hinge and set screw.
 - g. Bare Piping in Unfinished Service Spaces: Split casting, cast brass type with finish.
 - h. Bare Piping in Unfinished Service Spaces: Split plate, stamped steel type with hinge and set screw or spring clips.
 - i. Bare Piping in Equipment Rooms: Split casting, cast brass type.
 - j. Bare Piping in Equipment Rooms: Split plate, stamped steel type with set screw or spring clips.
 - k. Bare Piping at Floor Penetrations in Equipment Rooms: Split casting, floor plate type.
- B. Sleeves are not required for core drilled holes, *except in mechanical and electrical rooms or other wet areas where sleeves shall extend 2 inches above finished floor and shall be made watertight.*

- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical and electrical equipment areas or other wet areas 2 inches above finished floor level. Extended cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide ¼ inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 4. Steel Pipe Sleeves: For pipes smaller than 6 inches.
 - a. Steel Pipe Sleeves: For pipes 6 inches and larger, penetrating gypsum-board partitions.
 - b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast iron soil pipe to extend sleeve to 2 inches below finished floor level. Refer to Section 076200 – Sheet Metal Flashing and Trim for flashing.
 - 5. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Joint Seals for materials and installation.
- E. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeves size to allow for 1 inch annular clear space between pipe and sleeves for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast iron “wall pipes” for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- F. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Section 078400 – Firestopping Systems for materials.
- G. Verify final equipment locations for roughing-in.
- H. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

END OF SECTION

SECTION 23 0513

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2004.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- D. Operation Data: Include instructions for safe operating procedures.
- E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Baldor Electric Company/ABB Group: www.baldor.com.
- B. Leeson Electric Corporation: www.leeson.com.
- C. Regal-Beloit Corporation (Century): www.centuryelectricmotor.com.
- D. or approved equal.

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 26 0583 for required electrical characteristics.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

- A. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- B. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.
- C. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 0516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.
- B. Section 23 2300 - Refrigerant Piping.

1.03 REFERENCE STANDARDS

- A. EJMA (STDS) - EJMA Standards; Tenth Edition.
- B. FM (AG) - FM Approval Guide; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

1.05 REGULATORY REQUIREMENTS

- A. Conform to 1 requirements.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. Metraflex Company: www.metraflex.com.
 - 3. or approved equal.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Single braided, stainless steel.
- D. Pressure Rating: 125 psi up to 12 inch.
- E. End Connections: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. Metraflex Company: www.metraflex.com.
 - 3. or approved equal.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi up to 2 inch.
- E. End Connections: Flanged.

- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- E. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION

SECTION 23 0517

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch (25 mm) above finished floor.
 - 2. Provide sealant for watertight joint.
- B. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- E. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.
- G. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- E. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 23 0519
METERS AND GAGES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Positive displacement meters.
- B. Flow meters.
- C. Pressure gauges and pressure gauge taps.
- D. Thermometers and thermometer wells.
- E. Static pressure gauges.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle and Venturi; 2007.
- C. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- D. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance; 2012.
- E. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

1.04 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 POSITIVE DISPLACEMENT METERS (LIQUID)

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. FMC Technologies: www.fmctechnologies.com.
 - 3. Venture Measurement, a Danaher Corporation Company: www.venturemeasurement.com.
 - 4. or approved equal.

2.02 LIQUID FLOW METERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. McCrometer: www.mccrometer.com.
 - 3. Venture Measurement, a Danaher Company: www.venturemeasurement.com.
 - 4. Veris Industries: www.veris.com.
 - 5. or approved equal.
- B. Calibrated ASME MFC-3M Venturi orifice plate and flanges with valved taps, chart for conversion of differential pressure readings to flow rate, with pressure gauge in case.

2.03 PRESSURE GAUGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Moeller Instrument Company, Inc: www.moellerinstrument.com.
 - 3. Omega Engineering, Inc: www.omega.com.
 - 4. or approved equal.

- B. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch (115 mm) diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi.

2.04 PRESSURE GAUGE TAPPINGS

- A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi (1034 kPa).
- B. Needle Valve: Brass, 1/4 inch (6 mm) NPT for minimum 150 psi (1034 kPa).

2.05 DIAL THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 4. or approved equal.
- B. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
 - 1. Size: 5 inch (125 mm) diameter dial.
 - 2. Lens: Clear glass.
 - 3. Accuracy: 1 percent.
 - 4. Calibration: Degrees F.

2.06 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.07 STATIC PRESSURE GAUGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Veris Industries: www.veris.com.
 - 4. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 5. or approved equal.
- B. 3-1/2 inch (90 mm) diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.
- C. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch (60 mm) for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- E. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- F. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.02 SCHEDULE

- A. Positive Displacement Meters, Location:
 - 1. Expansion tank make-up.
- B. Flow Meters, Location:
 - 1. Heating water system.
- C. Pressure Gauges, Location and Scale Range:
 - 1. Pumps, 0 to 100 psi
 - 2. Expansion tanks, 0 to 100 psi
 - 3. Pressure tanks, 0 to 100 psi
- D. Stem Type Thermometers, Location and Scale Range:
 - 1. Headers to central equipment, 0 to 300 degrees F
 - 2. Boilers - inlets and outlets, 0 to 300 degrees F
 - 3. Water zone supply and return, 0 to 300 degrees F
 - 4. After major coils, 0 to 300 degrees F
 - 5. Domestic hot water supply and recirculation, 0 to 300 degrees F
- E. Thermometer Sockets, Location:
 - 1. Control valves 1 inch (25 mm) & larger - inlets and outlets.
 - 2. Cabinet heaters - inlets and outlets.

END OF SECTION

SECTION 23 0523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
- B. General requirements.
- C. Globe valves.
- D. Ball valves.
- E. Butterfly valves.
- F. Check valves.
- G. Gate valves.
- H. Plug valves.
- I. Chainwheels.

1.02 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.

1.03 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2017.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.
- F. ASME B31.9 - Building Services Piping; 2014.
- G. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.
- H. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014).
- I. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2014).
- J. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
- K. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
- L. MSS SP-67 - Butterfly Valves; 2017.
- M. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011, with Errata (2013).
- N. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.

- O. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
- P. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011.
- Q. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

1.05 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 - 2. Protect valve parts exposed to piped medium against rust and corrosion.
 - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 - 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 - 5. Secure check valves in either the closed position or open position.
 - 6. Adjust butterfly valves to closed or partially closed position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 - 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors in dry environment.
- C. Exercise the following precautions for handling:
 - 1. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Provide the following valves for the applications if not indicated on drawings:
 - 1. Throttling (Hydronic): Butterfly, Ball, and Globe.
 - 2. Isolation (Shutoff): Butterfly and Gate.
 - 3. Swing Check (Pump Outlet):
 - a. 2 NPS (50 DN) and Smaller: Bronze with bronze disc.
 - b. 2-1/2 NPS (65 DN) and Larger: Iron with lever and weight, lever and spring, or center-guided with resilient seat.
 - 4. Dead-End: Butterfly, single-flange (lug) type.
- B. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- C. Heating Hot Water Valves:
 - 1. 2 NPS (50 DN) and Smaller, Brass and Bronze Valves:
 - a. Threaded ends.
 - b. Angle: Bronze disc, Class 125.
 - c. Ball: Full port, one piece, brass trim.
 - d. Swing Check: Bronze disc, Class 125.

- e. Gate: NRS, Class 125.
- f. Globe: Bronze disc, Class 125.
- 2. 2-1/2 NPS (65 DN) and Larger, Iron Valves:
 - a. 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Threaded ends.
 - b. Ball: 2-1/2 NPS (65 DN) to 10 NPS (250 DN), Class 150.
 - c. Single-Flange Butterfly: 2-1/2 NPS (65 DN) to 12 NPS (300 DN), aluminum-bronze disc, EPDM seat, 200 CWP.
 - d. Grooved-End Butterfly: 2-1/2 NPS (65 DN) to 12 NPS (300 DN), 175 CWP.
 - e. Swing Check: Metal seats, Class 125.
 - f. Swing Check: 2-1/2 NPS (65 DN) to 12 NPS (300 DN), lever and spring closure control, Class 125.
 - g. Plate-Type Check: Single plate, metal seat, Class 125 .
 - h. Gate: NRS, Class 125.
 - i. Globe: 2-1/2 NPS (65 DN) to 12 NPS (300 DN), Class 125.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
- D. Valves in Insulated Piping: Provide 2 NPS (50 DN) stem extensions and the following features:
 - 1. Gate Valves: Rising stem.
 - 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: Extended neck.
 - 4. Memory Stops: Fully adjustable after insulation is installed.
- E. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Solder Joint Connections: ASME B16.18.
- F. General ASME Compliance:
 - 1. Building Services Piping Valves: ASME B31.9.

2.03 BRONZE ANGLE VALVES

- A. Class 125: CWP Rating: 200 psig: (1380 kPa).
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
 - 3. Ends: Threaded.
 - 4. Stem: Bronze.
 - 5. Disc: Bronze, PTFE, or TFE.
 - 6. Packing: Asbestos free.
 - 7. Handwheel: Bronze or aluminum.

2.04 BRONZE GLOBE VALVES

- A. Class 125: CWP Rating: 200 psig: (1380 kPa).
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
 - 3. Ends: Threaded or solder joint.
 - 4. Stem and Disc: Bronze or PTFE.
 - 5. Packing: Asbestos free.
 - a. Handwheel: Malleable iron.

2.05 IRON GLOBE VALVES

- A. Class 125: CWP Rating: 200 psig: (1380 kPa).
 - 1. Comply with MSS SP-85, Type I.
 - 2. Body: Gray iron; ASTM A126, with bolted bonnet.
 - 3. Ends: Flanged.
 - 4. Trim: Bronze.
 - 5. Packing and Gasket: Asbestos free.
 - 6. Operator: Handwheel or chainwheel.

2.06 BRASS BALL VALVES

- A. One Piece, Reduced Port with Brass Trim:
 - 1. Comply with MSS SP-110.
 - 2. CWP Rating: 400 psig (2760 kPa).
 - 3. Body: Forged brass.
 - 4. Ends: Threaded.
 - 5. Seats: PTFE or TFE.
 - 6. Stem: Brass.
 - 7. Ball: Chrome-plated brass.
- B. Two Piece, Full Port and Regular Port with Stainless Steel Trim:
 - 1. Comply with MSS SP-110.
 - 2. SWP Rating: 150 psig (1035 kPa).
 - 3. CWP Rating: 600 psig (4140 kPa).
 - 4. Body: Forged brass.
 - 5. Ends: Threaded.
 - 6. Seats: PTFE or TFE.
 - 7. Ball: Chrome-plated brass.

2.07 BRONZE BALL VALVES

- A. One Piece, Reduced Port with Bronze Trim:
 - 1. Comply with MSS SP-110.
 - 2. CWP Rating: 400 psig (2760 kPa).
 - 3. Body: Bronze.
 - 4. Ends: Threaded.
 - 5. Seats: PTFE.
- B. Two Piece, Regular Port and Full Port with Bronze or Brass Trim:
 - 1. Comply with MSS SP-110.
 - 2. SWP Rating: 150 psig (1035 kPa).
 - 3. CWP Rating: 600 psig (4140 kPa).
 - 4. Body: Bronze.
 - 5. Ends: Threaded.
 - 6. Seats: PTFE .
 - 7. Stem: Bronze or brass.

2.08 IRON BALL VALVES

- A. Split Body, Full Port:
 - 1. Comply with MSS SP-72.
 - 2. CWP Rating: 200 psig (1380 kPa).
 - 3. Body: ASTM A126, gray iron.
 - 4. Ends: Flanged.
 - 5. Seats: PTFE.
 - 6. Stem: Stainless steel.
 - 7. Ball: Stainless steel.

2.09 IRON, SINGLE FLANGE BUTTERFLY VALVES

- A. Lug type: Bi-directional dead end service without downstream flange.
 - 1. Comply with MSS SP-67, Type I.
 - 2. CWP Rating: 150 psig (1035 kPa).
 - 3. Body Material: ASTM A126 cast iron.
 - 4. Stem: One or two-piece stainless steel.
 - 5. Seat: NBR.
 - 6. Disc: Coated ductile iron.

2.10 IRON, GROOVED-END BUTTERFLY VALVES

- A. CWP Rating: 175 psig (1200 kPa).
 - 1. Comply with MSS SP-67, Type I.
 - 2. Body: Coated ductile iron.
 - 3. Stem: Stainless steel.
 - 4. Disc: Coated ductile iron.
 - 5. Disc Seal: EPDM.

2.11 BRONZE SWING CHECK VALVES

- A. Class 125: CWP Rating: 200 psig (1380 kPa).
 - 1. Comply with MSS SP-80, Type 3.
 - 2. Body Design: Horizontal flow.
 - 3. Body Material: Bronze, ASTM B62.
 - 4. Ends: Threaded.
 - 5. Disc: Bronze.

2.12 IRON, FLANGED END SWING CHECK VALVES

- A. Class 125: CWP Rating: 200 psig (1380 kPa) with Metal Seats.
 - 1. Comply with MSS SP-71, Type I.
 - 2. Design: Clear or full waterway with flanged ends.
 - 3. Body: Gray iron with bolted bonnet in accordance with ASTM A126.
 - 4. Trim: Bronze.
 - 5. Disc Holder: Bronze.
 - 6. Gasket: Asbestos free.

2.13 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

2.14 IRON, CENTER-GUIDED CHECK VALVES

2.15 IRON, PLATE-TYPE CHECK VALVES

2.16 BRONZE GATE VALVES

- A. Non-Rising Stem (NRS), Rising Stem (RS):
 - 1. Comply with MSS SP-80, Type I.
 - 2. Body Material: Bronze with integral seat and union-ring bonnet.
 - 3. Ends: Threaded or solder joint.
 - 4. Stem: Bronze.
 - 5. Disc: Solid wedge; bronze.
 - 6. Packing: Asbestos free.
 - 7. Handwheel: Malleable iron, bronze, or aluminum.

2.17 IRON GATE VALVES

- A. NRS or OS & Y:
 - 1. Comply with MSS SP-70, Type I.
 - 2. Class 125: 2-1/2 NPS (65 DN) to 12 NPS (300 DN), CWP Rating: 200 psig (1380 kPa).
 - 3. Body Material: Gray iron with bolted bonnet.

4. Ends: Flanged.
5. Trim: Bronze.
6. Disc: Solid wedge.
7. Packing and Gasket: Asbestos free.

2.18 CHAINWHEELS

- A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
 1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
 2. Attachment: For connection to ball and butterfly valve stems.
 3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
 4. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Prefabricated Trapeze-Framed Metal Strut Systems:
 - 1. Strut Channel or Bracket Material:
 - 2. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.
- C. Hanger Rods:
 - 1. Threaded zinc-plated steel unless otherwise indicated.
- D. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

END OF SECTION

SECTION 23 0548

VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration-isolated equipment support bases.
- B. Vibration isolators.
- C. Vibration-isolated and/or seismically engineered roof curbs.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- B. ASCE 19 - Structural Applications of Steel Cables for Buildings; 2016.
- C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; 2015.
- D. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment; 2002.
- E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment; 2004.
- F. FEMA 414 - Installing Seismic Restraints for Duct and Pipe; 2004.
- G. MFMA-4 - Metal Framing Standards Publication; 2004.
- H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.

1.04 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Perform design and installation in accordance with applicable codes.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
 - 2. Steel springs to function without undue stress or overloading.

2.02 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

- A. Structural Bases:
 - 1. Construction: Engineered, structural steel frames with welded brackets for side mounting of the isolators.
 - 2. Frames: Square, rectangular or T-shaped.
 - 3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.

2.03 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
- B. Non-Seismic Type:
 - 1. All Elastomeric-Fiber Glass Pads:
 - a. Configuration: Flat or molded.
 - b. Thickness: 0.25 inch minimum.

- c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
 2. Elastomeric Mounts:
 - a. Material: Oil, ozone, and oxidant resistant compounds.
 - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
 3. Steel Springs:
 - a. Assembly: Freestanding, laterally stable without housing.
 - b. Leveling Device: Rigidly connected to equipment or frame.
 4. Restrained Steel Springs:
 - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
 - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
 5. Elastomeric Hangers:
 - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
 - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
 6. Spring Hanger:
 - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
 - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
 7. Combination Elastomeric-Spring Hanger:
 - a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
 - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
 8. Thrust Restraints:
 - a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
 - b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.
- C. Seismic Type:
 1. Coil Springs Consisting of Single Elements:
 - a. Housing: Manufactured from cast iron material.
 - b. Ductile Material: Designed and rated for seismic applications.
 - c. Spring: Restrained by housing without significant degradation of vibration isolation capabilities during normal equipment operating conditions.
 - d. Resilient Snubbing Grommet System: Incorporated and designed with clearances of no more than 0.25 inch in any direction preventing direct metal-to-metal contact between supported member and fixed restraint housing.
 - e. Resilient Pad: Located in series with spring.
 - f. Coil Springs: Color coded elements to have a lateral stiffness greater than 0.8 times the rated vertical stiffness with 50 percent overload capacity.
 - g. Finish: Suitable for the application.

2.04 SEISMIC RESTRAINT SYSTEMS

- A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.
- B. Cable Restraints:
 1. Comply with ASCE 19.
 2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
 3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
 4. Use protective thimbles for cable loops where potential for cable damage exists.

- C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.
- D. Comply with:
 - 1. ASHRAE (HVACA) Handbook - HVAC Applications.
 - 2. FEMA 412.
 - 3. SMACNA (SRM).

2.05 VIBRATION-ISOLATED AND/OR SEISMICALLY ENGINEERED ROOF CURBS

- A. Vibration Isolation Curbs:
 - 1. Seismic Curb:
 - a. Location: Between structure and rooftop equipment.
 - b. Construction: Steel.
 - c. Integral vibration isolation to comply with requirements of this section.
 - d. Snubbers consist of minimum 0.25 inch thick resilient pads to avoid metal-to-metal contact without compromising vibration isolating capabilities.
 - e. Weather exposed components consist of corrosion resistant materials.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

3.02 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
 - 1. Up to 4 Inches Pipe Size: First three points of support.

3.03 INSTALLATION - SEISMIC

- A. Comply with:
 - 1. ASHRAE (HVACA) Handbook - HVAC Applications.
 - 2. SMACNA (SRM).
- B. Seismic Snubbers:
 - 1. Provide on all isolated equipment, piping and ductwork.
- C. Floor and Base-Mounted Equipment, Vibration Isolated Equipment and associated Vibration and Seismic Controls for Connections:
 - 1. Provide flexible connections between equipment and interconnected piping.
- D. Suspended Mechanical Equipment:
 - 1. Provide supports and bracing to resist seismic design force in any direction.
 - 2. Provide flexible connections between equipment and interconnected piping.
 - 3. Brace equipment hung from spring mounts using cable or other bracing that will not transmit vibration to the structure.
- E. Wall mounted Mechanical Equipment:
 - 1. Provide support and bracing to resist seismic design force in any direction.
 - 2. Install backing plates or blocking as required to deliver load to primary wall framing members.
 - 3. Anchoring to gypsum wallboard, plaster or other wall finish that has not been engineered to resist imposed loads is not permitted.
- F. Piping:

1. Provide seismic bracing in accordance ASCE 7.
 2. Provide supports, braces, and anchors to resist gravity and seismic design forces.
 3. Provide flexible connections between floor mounted equipment and suspended piping; between unbraced piping and restrained suspended items; as required for thermal movement; at building separations and seismic joints; and wherever relative differential movements could damage pipe in an earthquake.
 4. Brace resiliently supported pipe with cable bracing or alternate means designed to prevent transmission of vibrations and noise to the structure.
 5. Brace every run 5.0 feet or more in length with two transverse and one longitudinal bracing locations.
 6. Pipes and Connections Constructed of Ductile Materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections):
 - a. Provide transverse bracing at spacing not more than 40.0 feet on center.
- G. Ductwork:
1. Provide seismic bracing for ducts with cross sectional area greater than 6 sq ft (independent of duct contents).
 2. Provide seismic bracing for all ducts containing hazardous materials.
 3. Provide supports, braces, and anchors to resist gravity and seismic design forces.
 4. Install ducts and duct risers designed to accommodate interstory drift.
 5. Independently support in-line devices weighing more than 20 pounds.
 6. Independently support and brace all in-line devices weighing more than 75 pounds.
 7. Positively attach dampers, louvers, diffusers and similar appurtenances to ductwork with mechanical fasteners.
 8. Install duct supports designed to resist not less than 150 percent of the duct weight.

3.04 FIELD QUALITY CONTROL

- A. Inspect vibration isolation and/or seismic control components for damage and defects.
- B. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.
- C. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Terminal Units: Nameplates.
- B. Control Panels: Nameplates.
- C. Piping: Pipe markers.
- D. Small-sized Equipment: Nameplates.
- E. Valves: Tags and ceiling tacks where located above lay-in ceiling.
- F. UV-C Disinfection Fixtures: See Section 23 0566 for details.

2.02 NAMEPLATES

- A. Letter Color: White.
- B. Letter Height: 1/4 inch.
- C. Background Color: Black.
- D. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.04 ADHESIVE-BACKED DUCT MARKERS

- A. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.
- B. Style: Individual Label.

2.05 PIPE MARKERS

- A. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- C. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

END OF SECTION

SECTION 23 0566
ANTI-MICROBIAL ULTRAVIOLET EMITTERS FOR
HVAC DUCTS AND EQUIPMENT

PART 1 - GENERAL

1.01 ANTI-MICROBIAL ULTRAVIOLET EMITTERS DESCRIPTION

- A. The series UV-DUCT-FL includes modules for disinfecting air in air conditioning systems (HVAC) with a reduction of microbial load of 99.9%.
- B. These modules consist of a box structure (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid. They are generally applied along the ducts of air conditioning (pic. n.2).
- C. The modularity of this device allows a straightforward application in all types of conduct, also in the final sectors of the UTA (Air Handling Unit), with the ability to adapt to different needs and different sizes of ducts.
- D. The main characteristics of UV-DUCT-FL, as the compact dimensions and device controls, allow a quick and easy installation, directly inside the air conditioning ducts.
- E. **DEVICE REQUIREMENTS**
 - 1. UV-C device must consist of a box structure in stainless Steel (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid/cage. The air flow must pass entirely parallel or perpendicular to this "grid" of UV-C lamps.
- F. **ELECTRICAL AND SAFETY REQUIREMENTS**
 - 1. Power cable: 2#12 with 1#12 GRD. Metal cladding or conduit.
 - a. HVAC voltage 110V-240V: tie into HVAC power circuit after HVAC disconnect switch.
 - b. HVAC voltage greater than 240V: source power from a local electrical panel, do not tie into other circuits.
 - 2. Control wiring: #18 plenum rated.
 - 3. Service/disconnect switch:
 - a. Indicates on/off directions.
 - b. Disconnects power to all fixtures on designated circuit number (see drawings).
 - 4. Access Door Switches:
 - a. Affixed to each access door as designated on drawings (when applicable).
 - b. Install to disconnect power to UV-C circuit when access door is opened.
 - 5. Indicator LED:
 - a. Illuminates only when fixture bulbs are on.
 - b. Located as specified on drawings.
- G. **BUILDING AUTOMATION MONITORING**
 - 1. Each UV-C fixture is to be monitored by the building's BMS system via the HVAC equipment's BMS controller.
 - 2. At minimum, the following functions are to be monitored by the BMS:
 - a. UV-C COMMAND: ON/OFF (HVAC orders UV-C on/off)
 - b. UV-C STATUS: ON/OFF (UV-C bulbs are on/off)
 - 3. Incorporate at minimum, the new functions being monitored into the BMS user interface by way of graphical depiction. They are to appear amongst the other functions being monitored on the HVAC equipment.
 - 4. Initiate BMS alarm/notification when UV-C COMMAND does not match UV-C STATUS
 - 5. Reasons UV-C COMMAND does not match UV-C STATUS:
 - a. UV-C bulb failure.
 - b. UV-C fixture failure.
 - c. UV-C does not activate or deactivate when commanded.

H. IDENTIFICATION

1. Affix 1" rectangular plastic or vinyl label to:
 - a. UV-C fixture: UV-C circuit number.
 - b. Service switch: UV-C circuit number as well as panel name, breaker number, and location when power is brought directly from a panel (see drawings).
 - c. Indicating LED: "UV-C ON".
2. Affix blank round marker on T-Bar ceiling structures to approximately mark location of UV-C fixtures above drop ceilings.
3. Label Colors: Purple with white letters.

I. QUALITY ASSURANCE

1. Manufacturer must be ISO 9001:2015 and 13485 certified (at least).
2. The manufacturer for the above mentioned shall have at least 5 years of experience in the manufacturing and installation of such UV-C.
3. Manufacturer must be a IUVA (International UltraViolet Association) member at least for 3 years.
4. Manufacturer must be a registered EPA producer.

J. DEVICE PERFORMANCE

1. Device must be rated IP 20 or higher.
2. UV-C bulbs shall be Selective UV-C lamp (emission peak at 253.7 nm) high output and high efficiency, pure quartz, PLL one end, ozone free; lamp's life should be at least 18,000 hours.
3. Available lamp power must be 35W, 60W, or 95W.
4. System should be powered by electronic ballasts specific for UV-C rays lamps.
5. UV-C device must consist of a box structure in stainless Steel (flange) from which two UV lamps emerge, in the form of "U", protected by a stainless-steel grid/cage. The air flow must pass entirely parallel or perpendicular to this "grid" of UV-C lamps.
6. The Stainless-steel supply box should contain lamps' LED Synoptic view showing each and single lamp operating and alarms.
7. Device must be labeled to indicate: Power V, Hz, A, IP protection grade, - CEE 73/23 - 89/336 - 2002/95, year of production, item number.

K. SUBMITTALS

1. Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations
 - b. Installation methods
2. Device drawings including components, overall dimensions and required clearances.

L. DELIVERY, STORAGE, AND HANDLING

1. Store products in manufacturer's packaging until ready for installation.
2. Store products in-doors to protect from weather and excessive moisture.

M. WARRANTY

1. Manufacturer's standard limited warranty with the following warranty periods:
 - a. 2-year lamp warranty
 - b. 5-year limited device warranty

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer Information: Light Progress S.r.l., which is located at: Loc. San Lorenzo, 40 – 52031 – ANGIARI (AR), Italy; Tel: 888-580-8738; Email: team@lightprogress.com); Web: <http://www.lightprogress.com>
- B. ULTRAVIOLET GERMICIDAL IRRADIATION DEVICES FOR HVAC
 1. UV-DUCT-FL:
 - a. Compact duct or plenum mounted UVGI device for air disinfection.
 - b. Product: UV-DUCT-FL as manufactured by Light Progress S.r.l.
 - c. Model: UV-DUCT-FL 2/35HP-NX, 110-277 V, 2,35 W, 254nm, high output, low pressure mercury vapor, U-lamp.

- d. Model: UV-DUCT-FL 2/60HP-NX, 110-277 V, 2,60 W, 254nm, high output, low pressure mercury vapor, U-lamp.
- e. Model: UV-DUCT-FL 2/95HP-NX, 110-277 V, 2,95 W, 254nm, high output, low pressure mercury vapor, U-lamp.
- f. Dimensions:
 - 1) Stainless Steel box structure (LxWxH) of 16.14 inches x 5.12 inches x 2.76 inches
 - 2) Lamp length:
 - (a) UV-DUCT-FL 2/35/HP-NX = 7.2 inches
 - (b) UV-DUCT-FL 2/60/HP-NX = 15 inches
 - (c) UV-DUCT-FL 2/95/HP-NX = 20 inches

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until the air handling unit, plenum and main duct have been completely installed.
- B. If installation is the responsibility of another installer, notify project manager of unsatisfactory preparation before proceeding.
- C. PREPARATION
 - 1. Clean surface thoroughly prior to installation.
 - 2. Prepare surface using the methods recommended by the manufacturer for achieving the best result for installation.
 - 3. Ensure power supplied to the installation site is 110-277V, 50/60Hz.
- D. INSTALLATION
 - 1. Install in accordance with manufacturer's instructions.
 - 2. The contractor must verify placement of the device(s) according to existing conditions. The device must be relocated if conditions of installation do not reflect drawings/ specification. Placement of the device(s) must:
 - a. Yield desired light coverage inside the ductwork/ equipment.
 - b. Be positioned before the first takeoff from main ductwork trunks, where applicable, so all zones effected by the equipment receive treated air.
 - c. Maintain reasonable accessibility and clearances used for maintenance, cleaning, and bulb replacement.
 - 3. Install by making two openings on the AHU/plenum/duct wall and inserting the module's lamps inside the AHU/plenum/duct according to provided installation template.
 - 4. To fasten the device, screw the SS body on the external wall of the channel, using supplied screws.
 - 5. Test for proper seal of the rubber gasket(s) while device is in operation. All penetrations shall be sealed and made air tight.
 - 6. Maintain rigidity and sturdy support of ductwork or plenum as part of installation.
- E. PROTECTION
 - 1. Store device(s) and bulb(s) to protect against damage before installation. Protect installed device until completion of project.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

1.02 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; 2005, Seventh Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Final test report forms to be used.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 - 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.

- b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
- c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Access doors are closed and duct end caps are in place.
 - 8. Air outlets are installed and connected.
 - 9. Duct system leakage is minimized.
 - 10. Hydronic systems are flushed, filled, and vented.
 - 11. Proper strainer baskets are clean and in place.
 - 12. Service and balance valves are open.
- B. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Measure air quantities at air inlets and outlets.
- C. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- D. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- E. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- F. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

3.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Terminal Units.
 - 2. Air Inlets and Outlets.

3.08 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
- B. Air Cooled Condensers:
 - 1. Identification/number.
 - 2. Location.
 - 3. Manufacturer.
 - 4. Model number.
 - 5. Serial number.
- C. Cooling Coils:
 - 1. Identification/number.
 - 2. Location.
 - 3. Service.
 - 4. Manufacturer.
 - 5. Air flow, design and actual.
 - 6. Entering air DB temperature, design and actual.
 - 7. Entering air WB temperature, design and actual.
 - 8. Leaving air DB temperature, design and actual.
 - 9. Leaving air WB temperature, design and actual.
- D. Heating Coils:
 - 1. Identification/number.
 - 2. Location.
 - 3. Service.
 - 4. Manufacturer.
 - 5. Air flow, design and actual.
 - 6. Water flow, design and actual.
 - 7. Water pressure drop, design and actual.
 - 8. Entering water temperature, design and actual.
 - 9. Leaving water temperature, design and actual.
- E. Return Air/Outside Air:
 - 1. Identification/location.
 - 2. Design air flow.
 - 3. Actual air flow.
 - 4. Design return air flow.
 - 5. Actual return air flow.
 - 6. Design outside air flow.

7. Actual outside air flow.
 8. Return air temperature.
 9. Outside air temperature.
- F. Terminal Unit Data:
1. Manufacturer.
 2. Type, constant, variable, single, dual duct.
 3. Identification/number.
 4. Location.
 5. Model number.
 6. Size.
 7. Minimum static pressure.
 8. Minimum design air flow.
 9. Maximum design air flow.
 10. Maximum actual air flow.
 11. Inlet static pressure.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Jacketing and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- C. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation; 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant; 1984, Reaffirmed 1994..
- G. UL 181A - Closure Systems for Use with Rigid Air Ducts; Current Edition, Including All Revisions.
- H. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.04 QUALITY ASSURANCE

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

- A. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
- B. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure-sensitive tape.

2.03 JACKETING AND ACCESSORIES

- A. Reinforced Tape:
 - 1. FSK tape suitable for sealing seams between insulation, insulated elbows, and fittings resulting in a tight, smooth surface without wrinkles.
 - 2. Comply with UL 723 or ASTM E84.
 - 3. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
- B. Plain Foil Tape:
 - 1. Aluminum foil with pressure-sensitive adhesive on paper release liner.
 - 2. Finish: Plain foil.
- C. UL181 Tape for Rigid and Flexible Ductwork:
 - 1. Comply with UL 181A for rigid ductwork.
 - 2. Comply with UL 181B for flexible ductwork.
 - 3. Aluminum foil coated with pressure-sensitive adhesive on paper release liner.
 - 4. Foil tape suitable for sealing seams between insulation, insulated elbows, and fittings resulting in a tight, smooth surface without wrinkles.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated Ducts Conveying Air Above Ambient Temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.
- C. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- F. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- G. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- H. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
- I. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- J. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- K. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- M. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

- A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

2.03 CELLULAR GLASS

- A. Block Insulation: ASTM C552, Type I, Grade 6.
 - 1. K Value: 0.35 at 100 degrees F.
 - 2. Service Temperature: 800 degrees F, maximum.
 - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

2.04 EXPANDED POLYSTYRENE

- A. Insulation: ASTM C578; rigid closed cell.
 - 1. K Value: 0.23 at 75 degrees F.
 - 2. Maximum Service Temperature: 165 degrees F.
 - 3. Maximum Water Vapor Permeance: 5.0 perm.

2.05 POLYETHYLENE

- A. Insulation: Flexible closed-cell polyethylene tubing, slit lengthwise for installation, complying with applicable requirements of ASTM D1056.
 - 1. K Value: ASTM C177; 0.25 at 75 degrees F.
 - 2. Maximum Service Temperature: 300 degrees F.
 - 3. Density: 2 pcf.
 - 4. Maximum Moisture Absorption: 1.0 percent by volume.
 - 5. Moisture Vapor Permeability: 0.05 perm inch, when tested in accordance with ASTM E96/E96M.
 - 6. Connection: Contact adhesive.

2.06 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.

2.07 JACKETING AND ACCESSORIES

- A. PVC Plastic.
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil, 0.010 inch.
 - e. Connections: Brush on welding adhesive.
 - 2. Covering Adhesive Mastic: Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- F. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 8400.
- H. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

END OF SECTION

SECTION 23 0800
COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. See Section 01 9113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 01 9113.
- B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.
- C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.
- D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
 - 1. Control system.
 - 2. Major and minor equipment items.
 - 3. Piping systems and equipment.
 - 4. Ductwork and accessories.
 - 5. Terminal units.
 - 6. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
- E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 7800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.
- B. Section 23 0993 - Sequence of Operations for HVAC Controls.

1.03 REFERENCE STANDARDS

- A. ASHRAE Guideline 1.1 - The HVAC Commissioning Process; 2012.

1.04 SUBMITTALS

- A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.
- B. Draft Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
 - 1. System name.
 - 2. List of devices.
 - 3. Step-by-step procedures for testing each controller after installation, including:
 - a. Process of verifying proper hardware and wiring installation.
 - b. Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - c. Process of performing operational checks of each controlled component.
 - d. Plan and process for calibrating valve and damper actuators and all sensors.
 - e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
 - 4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has "passed" and is operating within the contract parameters.
 - 5. Description of the instrumentation required for testing.

6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.
- C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.
- D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
 1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
 2. Full as-built set of control drawings.
 3. Full as-built sequence of operations for each piece of equipment.
 4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
 - a. Floor.
 - b. Room number.
 - c. Room name.
 - d. Reference drawing number.
 - e. Air terminal unit tag ID.
 - f. Heating and/or cooling valve tag ID.
 - g. Minimum air flow rate.
 - h. Maximum air flow rate.
 5. Full print out of all schedules and set points after testing and acceptance of the system.
 6. Full as-built print out of software program.
 7. Electronic copy on disk of the entire program for this facility.
 8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
 9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
 10. Control equipment component submittals, parts lists, etc.
 11. Warranty requirements.
 12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
 13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
 - a. Sequences of operation.
 - b. Control drawings.
 - c. Points lists.
 - d. Controller and/or module data.
 - e. Thermostats and timers.
 - f. Sensors and DP switches.
 - g. Valves and valve actuators.
 - h. Dampers and damper actuators.
 - i. Program setups (software program printouts).
- E. Project Record Documents: See Section 01 7800 for additional requirements.
 1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
 2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.
- F. Draft Training Plan: In addition to requirements specified in Section 01 7900, include:
 1. Follow the recommendations of ASHRAE Guideline 1.1.
 2. Control system manufacturer's recommended training.

3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.
- G. Training Manuals: See Section 01 7900 for additional requirements.
 1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

PART 3 EXECUTION

3.01 PREPARATION

- A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.
- B. Furnish additional information requested by the Commissioning Authority.
- C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.
- D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
- E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.
- F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.
- G. Provide temperature and pressure taps in accordance with Contract Documents.

3.02 INSPECTING AND TESTING - GENERAL

- A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.
- B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.
- C. Provide two-way radios for use during the testing.
- D. Valve/Damper Stroke Setup and Check:
 1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
 2. Set pump/fan to normal operating mode.
 3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
 4. Command valve/damper open; verify position is full open and adjust output signal as required.
 5. Command valve/damper to a few intermediate positions.
 6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- E. Isolation Valve or System Valve Leak Check: For valves not by coils.
 1. With full pressure in the system, command valve closed.

2. Use an ultra-sonic flow meter to detect flow or leakage.
- F. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

- A. TAB: Testing, adjusting, and balancing of HVAC.
- B. Coordinate commissioning schedule with TAB schedule.
- C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.
- D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.
- E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.
- F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

- A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.
- B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.
- C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.
- D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
 1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
 2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.
- E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.
- F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
 1. Setpoint changing features and functions.
 2. Sensor calibrations.
- G. Demonstrate to the Commissioning Authority:
 1. That all specified functions and features are set up, debugged and fully operable.
 2. That scheduling features are fully functional and setup, including holidays.
 3. That all graphic screens and value readouts are completed.
 4. Correct date and time setting in central computer.
 5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
 6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
 7. Power failure and battery backup and power-up restart functions.
 8. Global commands features.
 9. Security and access codes.
 10. Occupant over-rides (manual, telephone, key, keypad, etc.).
 11. O&M schedules and alarms.
 12. Occupancy sensors and controls.
 13. All control strategies and sequences not tested during controlled equipment testing.

- H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 7800 for additional requirements.
- B. Add design intent documentation furnished by Engineer to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.06 DEMONSTRATION AND TRAINING

- A. See Section 01 7900 for additional requirements.
- B. Demonstrate operation and maintenance of HVAC system to Owner' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.
- C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.
- D. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned. Provide the following minimum durations of training:
 - 1. HVAC Control System: 8 hours.
 - 2. Air Terminal Units: 8 hours.
 - 3. Split System AC or Heat Pumps: 8 hours.
- E. TAB Review: Instruct Owner's personnel for minimum 8 hours, after completion of TAB, on the following:
 - 1. Review final TAB report, explaining the layout and meanings of each data type.
 - 2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
 - 3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
 - 4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
 - 5. Other salient information that may be useful for facility operations, relative to TAB.
- F. HVAC Control System Training: Perform training in at least three phases:
 - 1. Phase 1 - Basic Control System: Provide minimum of 16 hours of actual training on the control system itself. Upon completion of training, each attendee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
 - a. This training may be held on-site or at the manufacturer's facility.
 - b. If held off-site, the training may occur prior to final completion of the system installation.
 - c. For off-site training, Contractor shall pay expenses of up to two attendees.
 - 2. Phase 2 - Integrating with HVAC Systems: Provide minimum of 16 hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
 - a. The specific hardware configuration of installed systems in this facility and specific instruction for operating the installed system, including interfaces with other systems, if any.
 - b. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.

- c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.
 - d. Every display screen, allowing time for questions.
 - e. Point database entry and modifications.
3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of 8 hours of training. Tailor training session to questions and topics solicited beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning operation of the system.
- G. Provide the services of manufacturer representatives to assist instructors where necessary.
- H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

END OF SECTION

SECTION 23 0913

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control Valves:
 - 1. Globe pattern.
- B. Dampers.
- C. Damper Operators:
- D. Thermostats:
 - 1. Electric room thermostats.
- E. Control valves.
- F. Automatic dampers.
- G. Damper operators.
- H. Miscellaneous accessories.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, and gauge taps.
- B. Section 23 2114 - Hydronic Specialties.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2012.
- B. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; 2013.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL VALVES

- A. Globe Pattern:
 - 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
 - 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
 - 3. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Replaceable plugs and seats of stainless steel.
 - c. Size for 3 psig maximum pressure drop at design flow rate.
 - d. two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.

2.03 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.

- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch.
- C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.

2.04 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

2.05 THERMOSTATS

- A. Electric Room Thermostats:
 - 1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control, integrated into the existing JCI DDC system..
 - 2. Service: Cooling and heating.
 - 3. Covers: Locking with set point adjustment, with thermometer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide guards on thermostats in all areas.
- C. Provide valves with position indicators and with pilot positioners where sequenced with other controls.
- D. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- E. Provide conduit and electrical wiring in accordance with Section 26 0583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION

SECTION 23 0923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. System description.
- B. Operator interface.
- C. Controllers.
- D. System software.
- E. Controller software.
- F. HVAC control programs.

1.02 RELATED REQUIREMENTS

- A. Section 23 0913 - Instrumentation and Control Devices for HVAC.
- B. Section 23 0993 - Sequence of Operations for HVAC Controls.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ANSI/CEA 709.1.D - Control Network Protocol Specification; 2014.
- B. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks; 2012.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for each system component and software module in the existing JCI BMS.
- C. Shop Drawings:
 - 1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
 - 2. List connected data points, including connected control unit and input device.
 - 3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
 - 4. Show new equipment configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
 - 5. Indicate description and sequence of operation of operating, user, and application software.
- D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.06 WARRANTY

- A. Correct defective Work within a five year period after Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Johnson Controls, Inc: www.johnsoncontrols.com/#sle.

2.02 SYSTEM DESCRIPTION

- A. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units and the JCI BMS. Individual terminal unit control is specified in Section 23 0913.
- B. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.
- C. All Unit ventilators and condensers will be integrated into the existing Building Management System.
- D. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

2.03 OPERATOR INTERFACE

- A. Workstation, controllers, and control backbone to communicate using BACnet protocol and addressing.
- B. BACnet protocol to comply with ASHRAE Std 135.

2.04 CONTROLLERS

- A. Building Controllers:
 - 1. General:
 - a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
 - b. Share data between networked controllers.
 - c. Continuously check processor status and memory circuits for abnormal operation.
 - d. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
 - e. Communication with other network devices to be based on assigned protocol.
 - 2. Communication:
 - a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
 - b. Perform routing when connected to a network of custom application and application specific controllers.
 - c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
 - 3. Anticipated Environmental Ambient Conditions:
 - a. Outdoors and/or in Wet Ambient Conditions:
 - 1) Mount within waterproof enclosures.
 - 2) Rated for operation at 40 to 150 degrees F.
 - b. Conditioned Space:
 - 1) Mount within dustproof enclosures.
 - 2) Rated for operation at 32 to 120 degrees F.
 - 4. Provisions for Serviceability:
 - a. Diagnostic LEDs for power, communication, and processor.
 - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
 - 5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
 - 6. Power and Noise Immunity:
 - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
 - b. Perform orderly shutdown below 80 percent of nominal voltage.
 - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.
- B. Input/Output Interface:
 - 1. Hardwired inputs and outputs tie into the JCI BMS through building, custom application, or application specific controllers.

2. All Input/Output Points:
 - a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
 - b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:
 - a. Allow monitoring of On/Off signals from remote devices.
 - b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
 - c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Comply with all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
 - a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
 - b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
 - a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
 - b. Outputs provided with three position (On/Off/Auto) override switches.
 - c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
 - a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
 - b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
 - c. Drift to not exceed 0.4 percent of range per year.
8. Tri State Outputs:
 - a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
 - b. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
9. System Object Capacity:
 - a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
 - b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.05 LOCAL AREA NETWORK (LAN)

- A. Provide communication between control units over local area network (LAN).
- B. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.
- C. Transmission Median: Fiber optic or single pair of solid 24 gauge twisted, shielded copper cable.
- D. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.06 HVAC CONTROL PROGRAMS

- A. General:
 1. Support Inch-pounds and SI (metric) units of measurement.
 2. Identify each HVAC Control system.
- B. Optimal Run Time:

1. Control start-up and shutdown times of HVAC equipment for both heating and cooling by JCI BMS.
2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
3. Operator commands for new unit ventilators:
 - a. Define term schedule.
 - b. Add/delete fan status point.
 - c. Add/delete outside air temperature point.
 - d. Add/delete mass temperature point.
 - e. Define heating/cooling parameters.
4. Control Summary for new units:
 - a. HVAC Control system begin/end status.
 - b. Heating/cooling mode status.
 - c. Start/Stop times.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.

3.02 INSTALLATION

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 0993.
- C. Provide conduit and electrical wiring in accordance with Section 26 0583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION

SECTION 23 0993

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections. All equipment to be integrated into, and controlled by the existing JCI DDC system
- B. Sequence of operation for:
 - 1. Unit ventilators.
 - 2. Heating coils.
 - 3. Heating water zone control.

1.02 RELATED REQUIREMENTS

- A. Section 23 0913 - Instrumentation and Control Devices for HVAC.
- B. Section 23 0923 - Direct-Digital Control System for HVAC.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
 - 1. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
 - 2. Include at least the following sequences:
 - a. Start-up.
 - b. Warm-up mode.
 - c. Normal operating mode.
 - d. Unoccupied mode.
 - e. Shutdown.
 - f. Temperature and pressure control, such as setbacks, setups, resets, etc.
 - g. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 - h. Effects of power or equipment failure with all standby component functions.
 - i. Sequences for all alarms and emergency shut downs.
 - j. Seasonal operational differences and recommendations.
 - 3. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 - 4. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
- C. Points List: Submit list of all control points indicating at least the following for each point.
 - 1. Name of controlled system.
 - 2. Point abbreviation.
 - 3. Point description; such as dry bulb temperature, airflow, etc.
 - 4. Display unit.
 - 5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 UNIT VENTILATORS

- A. Single temperature unit mounted thermostat set at 75 degrees F maintains constant space temperature during the day and 15 degrees F cooler at night by modulating four-way control valve. During heating cycle, modulate hot water supply to coil. When space temperature is at thermostat setting, prevent flow from occurring in coil.
- B. Change over from heating to cooling by indexing thermostat from thermostat on supply piping. When supply is above room temperature, operate thermostat in direct acting manner, opening valve when temperature falls below thermostat setting. When supply is below room temperature, operate thermostat in reverse acting manner, opening valve when space temperature rises above thermostat setting.
- C. For heating and cooling fan coil units with fan speed control during heating cycle, increase fan speed as space temperature falls below thermostat setting, provided hot water is available. During cooling cycle, increase fan speed as space temperature rises above thermostat setting, provided chilled water is available.

3.02 HEATING COILS

- A. Single temperature thermostat set at 75 degrees F maintains constant space temperature during the day and 15 degrees F cooler at night by modulating two-way control heating valve.

3.03 HEATING WATER ZONE CONTROL

- A. Control heating water supply temperature set at 180 degrees F in accordance with outdoor reset schedule by modulating heating water control valve.

END OF SECTION

SECTION 23 0995
BACNET BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General, Supplementary, and Special Conditions, and Division 1 - General Requirements, apply to work specified in this section. Subcontractor must familiarize himself with the terms of the above documents.

1.02 QUALIFICATIONS OF BIDDER

- A. All bidders must be building automation contractors in the business of installing direct digital control building automation systems for a minimum of 3 years.
- B. All bidders must have a service and installation office in the (city name) area.
- C. All bidders must be authorized distributors or branch offices of the manufacturers specified.
- D. All bidders must have a trained staff of application engineers, who have been certified by the manufacturer in the configuration, programming and service of the automation system.
- E. The following bidders have been pre-qualified:
- F. Andover Controls Corporation
- G. Or as approved by Owners.

1.03 SCOPE OF WORK

- A. The Contractor shall furnish and install a complete building automation system including all necessary hardware and all operating and applications software necessary to perform the control sequences of operation as called for in this specification. All components of the system - workstations, application controllers, unitary controllers, etc. shall communicate using the BACnet protocol, as defined by ASHRAE Standard 135-2012. No gateways shall be used for communication to controllers furnished under this section. At a minimum, provide controls for the following:
 - 1. Air handling units
 - 2. Return air fans
 - 3. Exhaust and supply fans
 - 4. Boilers including hot water pumps
 - 5. Refrigerant leak detection system
 - 6. Smoke evacuation sequence of AHUs and return fans including smoke control dampers and fire command override panel.
 - 7. Finned tube radiation control
 - 8. Cabinet unit heater controls
 - 9. Power wiring to DDC devices, smoke control dampers and BAS panels.
- B. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers, Standalone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators, control panels, and other accessory equipment, along with a complete system of electrical interlocking wiring to fill the intent of the specification and provide for a complete and operable system. Except as otherwise specified, provide operators for equipment such as dampers if the equipment manufacturer does not provide these. Coordinate requirements with the various Contractors.
- C. The BAS contractor shall review and study all HVAC drawings and the entire specification to familiarize himself with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.
- D. All interlocking, wiring and installation of control devices associated with the equipment listed below shall be provided under this Contract. When the BAS system is fully installed and operational, the BAS Contractor and representatives of the Owner will review and check out the system. At that time, the BAS contractor shall demonstrate the operation of the system and prove that it complies with the intent of the drawings and specifications.

- E. Provide services and manpower necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor and Owner's representative.
- F. All work performed under this section of the specifications will comply with all codes, laws and governing bodies. If the drawings and/or specifications are in conflict with governing codes, the Contractor shall submit a proposal with appropriate modifications to the project to meet code restrictions. If this specification and associated drawings exceed governing code requirements, the specification will govern. The Contractor shall obtain and pay for all necessary construction permits and licenses.

1.04 TRAINING

- A. Provide a minimum of (40) hours of on-site training for (3) system operators. The training will be hands-on type at the owner's office. The training class will use the actual Operator's Manual that will be submitted for this project. In addition provide (2) weeks of classroom training for one individual at the Manufacturer's sponsored training courses.
- B. System Description
 - 1. The Building Automation System (BAS) shall be designed in strict accordance with ASHRAE's BACnet standard, 135-2012, to provide interoperability between different building subsystems. The system shall also provide a graphical, web-based operator interface that allows for instant access to any system through a standard browser.
 - 2. The system shall use BACnet network types and protocols exclusively. Non-BACnet-based systems are not acceptable. The contractor must provide PC-based programming workstations, operator workstations and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions. Contractor must provide manufacturer's Protocol Implementation Conformance Statement (PICS) for workstation software and every controller model that are installed.

1.05 FOR THIS PROJECT THE SYSTEM SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A. Administration and Programming Workstation(s).
 - 1. The BAS Contractor shall furnish (qty) Administration and Programming Workstation Computers and (qty) printer(s) as described in Part 2 of the specification. These workstations must be running the standard workstation software developed and tested by the manufacturer of the network controllers and the standalone controllers. No third party front-end workstation software will be acceptable. Workstations must conform to the B-OWS BACnet device profile.
- B. Web-Based Operator Workstations
 - 1. The BAS Contractor shall furnish licenses for (qty) concurrent users to the BAS system. Web-based users shall have access to all system points and graphics, shall be able to receive and acknowledge alarms, and shall be able to control setpoints and other parameters. A central web server shall be provided to manage the web-based users. The web-based interface must conform to the B-OWS BACnet device profile.
- C. Ethernet-based Network Router and/or Controller(s).
 - 1. The BAS Contractor shall furnish (qty) Ethernet-based network controllers as described in Part 2 of the specification. These controllers will connect directly to the Operator Workstation over Ethernet, using the BACnet/IP protocol at a minimum of 100mbps, and provide communication to the Standalone Digital Control Units and/or other Input/Output Modules. Network Controllers shall conform to BACnet device profile B-BC. Network controllers that utilize RS232 serial communications or ARCNET to communicate with the workstations will not be accepted.
 - 2. Network Controllers shall be tested and certified by the BACnet Testing Laboratory (BTL) as Building Controllers (B-BC).
- D. Standalone Digital Control Units (SDCUs).
 - 1. Provide the necessary quantity and types of SDCUs to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each SDCU will operate completely standalone, containing all of the I/O and programs to control its associated equipment. Each SDCU shall conform to the BACnet device profile B-AAC.

2. SDCUs shall be tested and certified by the BACnet Testing Laboratory (BTL) as Advanced Application Controllers (B-AAC).

1.06 WORK BY OTHERS

- A. The BAS Contractor shall cooperate with other contractors performing work on this project necessary to achieve a complete and neat installation. To that end, each contractor shall consult the drawings and specifications for all trades to determine the nature and extent of others' work.
- B. The BAS Contractor shall furnish all control valves, sensor wells, flow meters and other similar equipment for installation by the Mechanical Contractor.
- C. The BAS Contractor shall provide field supervision to the designated contractor for the installation of the following:
 1. Automatic control dampers
- D. The Electrical Contractor shall provide:
 1. All power wiring to motors, heat trace, junction boxes for power to BAS panels.
 2. Furnish smoke detectors and wire to the building fire alarm system. HVAC Contractor to mount devices. BAS Contractor to hardwire to fan shut down.
 3. Auxiliary contact (pulse initiator) on the electric meter for central monitoring of kWH and KW. Electrical Contractor shall provide the pulse rate for remote readout to the BAS. BAS contractor to coordinate this with the electrical contractor.

1.07 CODE COMPLIANCE

- A. Provide BAS components and ancillary equipment, which are UL-916 listed and labeled.
- B. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.
- C. All wiring shall conform to the National Electrical Code.
- D. All smoke dampers shall be rated in accordance with UL 555S.
- E. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.
- F. Comply with FCC, Part 68 rules for telephone modems and data sets.
- G. Submittals
 1. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the drawings, the Contractor shall furnish a CD containing the identical information. Drawings shall be B size or larger.
 2. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typical drawings will be allowed where appropriate.
 3. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification. Valve, damper and air flow station schedules shall indicate size, configuration, capacity and location of all equipment.
 4. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs.
 5. Submit five (2) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor prior to submitting shall check all documents for accuracy.
 6. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

1.08 SYSTEM STARTUP & COMMISSIONING

- A. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report will be submitted to the owner indicating that the installed system functions in accordance with the plans and specifications.
- B. The BAS contractor shall commission and set in operating condition all major equipment and systems, such as the chilled water, hot water and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives.
- C. The BAS Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building. The BAS Contractor shall have a trained technician available on request during the balancing of the systems. The BAS Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his contract.

1.09 TRAINING

- A. The BAS Contractor shall provide both on-site and classroom training to the Owner's representative and maintenance personnel per the following description:
- B. On-site training shall consist of a minimum of (40) hours of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include
 - 1. System Overview
 - 2. System Software and Operation
 - a. System access
 - b. Software features overview
 - c. Changing setpoints and other attributes
 - d. Scheduling
 - e. Editing programmed variables
 - f. Displaying color graphics
 - g. Running reports
 - h. Workstation maintenance
 - i. Application programming
 - j. Operational sequences including start-up, shutdown, adjusting and balancing.
 - k. Equipment maintenance.
- C. Classroom training will include a minimum of (1) training slot for two weeks of course material covering workstation operation and controller programming.

1.10 OPERATING AND MAINTENANCE MANUALS

- A. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the entire BAS. This documentation shall include specific part numbers and software versions and dates. A complete list of recommended spare parts shall be included with the lead time and expected frequency of use of each part clearly identified.
- B. Following project completion and testing, the BAS contractor will submit as-built drawings reflecting the exact installation of the system. The as-built documentation shall also include a copy of all application software both in written form and on diskette.

1.11 WARRANTY

- A. The BAS contractor shall warrant the system for 12 months after system acceptance and beneficial use by the owner. During the warranty period, the BAS contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the Sequence of Operation section of the specification.
- B. Updates to the manufacturer's software shall be provided at no charge during the warranty period.

PART 2 - PRODUCTS

2.01 SYSTEM ARCHITECTURE

A. General

1. The Building Automation System (BAS) shall consist of Network Router/Controllers (NRCs), a family of Standalone Digital Control Units (SDCUs), Administration and Programming Workstations (APWs), Web-based Operator Workstations (WOWs), and one File Server to support system configurations where more than three operator workstations are required. The BAS shall provide control, alarm detection, scheduling, reporting and information management for the entire facility, and Wide Area Network (WAN) if applicable, from a single ODBC-compliant database.
2. The system shall be designed with a top-level 10/100bT Ethernet network, using the BACnet/IP protocol. A sub-network using the BACnet MS/TP protocol, with a minimum of 76.8kb speed, shall connect the local, stand-alone controllers with Ethernet-level controller/routers. The use of ARCNET, LON works, RS-232 serial communications, or BACnet Ethernet for these controllers is prohibited.
3. Level 1 Network Description
 - a. Level 1, the main backbone of the system, shall be an Ethernet 10/100bT LAN/WAN, using BACnet/IP as the communications protocol. Network Router/Controllers, Operator Workstations, and the Central File Server shall connect directly to this network without the need for Gateway devices.
4. Level 2 Network Description
 - a. Level 2 of the system shall consist of one or more BACnet MS/TP field buses managed by the Network Router/Controllers. Minimum speed shall be 76.8kbps. The Level 2 field bus consists of an RS485, token passing bus that supports up to 127 Standalone Digital Control Units (SDCUs) for operation of HVAC equipment and lighting

B. BAS LAN Segmentation

1. The BAS shall be capable of being segmented, through software, into multiple local area networks (LANs) distributed over a wide area network (WAN), sharing a single file server. This enables workstations to manage a single LAN (or building), and/or the entire system with all devices being assured of being updated by and sharing the most current database. In the case of a single workstation system, the workstation shall contain the entire database - with no need for a separate file server.

C. Standard Network Support

1. All NRCs, Workstation(s) and File Server shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN with no required gateways. Furthermore, the NRC's, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Systems Department as all devices utilize standard TCP/IP components.

D. System Expansion

1. The BAS system shall be scalable and expandable at all levels of the system using the same software interface, and the same Level 1 and Level 2 controllers. Systems that require replacement of either the workstation software or field controllers in order to expand the system shall not be acceptable.
2. The BAS shall be expandable to include Security and Access Control functions at any time in the future with no additional workstations, front-end software or Level 1 controllers required. Ethernet-based security/card access controllers shall be able to be added to the existing Level 1 network, to perform security and card access applications. In this way, an owner's existing investment in wiring infrastructure may be leveraged and the cost and inconvenience of adding new field bus wiring will be minimized.
3. Additionally, an integrated video badging option must be able to be included with no additional workstations required. This photo ID option must share the same database as the BAS in order to eliminate the need for updating multiple databases.

4. Additional web-based operator licenses shall added in the field through an upgrade of the web server's security key, with no re-programming required.
 5. The system shall use the same application programming language for all levels: Operator Workstation, Network Router/Controller, and Standalone Digital Control Unit. Furthermore, this single programming language shall be used for all applications: environmental control, card access control, intrusion detection and security, lighting control, leak detection / underground storage tank monitoring, and digital data communication interfaces to third party microprocessor-based devices.
- E. Support For Open Systems Protocols
1. All hardware and software included under this section shall conform to BACnet standard 135-2001, to promote interoperability between building subsystems. Additionally, the BAS design must include solutions for the integration of the following "open systems" protocols: LonTalk[®], Modbus, and digital data communication to third party microprocessors such as chiller controllers, fire panels and variable frequency drives (VFDs).
 2. The system shall also provide the ability to program custom ASCII communication drivers, that will reside in a BACnet Gateway, for communication to third party systems and devices. These drivers will provide real time monitoring and control of the third party systems. Once programmed, these data points shall be monitored and controlled in exactly the same manner as native BAS data points.

2.02 NETWORK ROUTER/CONTROLLERS (NRCS)

A. General

1. Network Router Controllers shall combine both network routing functions and control functions into a single unit. NRC's shall route communications between the BACnet/IP network and the BACnet MS/TP field network. They shall also be responsible for monitoring and controlling their own HVAC equipment such as an AHU or boiler. A sufficient number of NRCs shall be supplied to fully meet the requirements of this specification and the attached point list.
2. Each NRC shall be classified as a "native" BACnet device, supporting the BACnet Building Controller (B-BC) profile. Controllers that support a lesser profile such as B-SA are not acceptable. NRCs shall be tested and certified by the BACnet Testing Laboratory (BTL) as Advanced Application Controllers (B-BC).

B. Hardware Specifications

1. Memory:
 - a. Both the operating system of the controller, plus the application program for the controller, shall be stored in non-volatile, FLASH memory. Controllers shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory.
2. Communication Ports:
 - a. Each NRC shall provide communication to both the Workstation(s) and the field buses. An on-board 10/100bT Ethernet port shall be provided, as well as a RS-485 port for communications to a maximum of 127 MS/TP devices.
3. Modular Expandability:
 - a. The system shall employ a modular I/O design to allow easy expansion. Input and output capacity is to be provided through plug-in modules of various types. It shall be possible to combine I/O modules as desired to meet the I/O requirements for individual control applications.
4. Hardware Override Switches:
 - a. All digital outputs shall include three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall be built into the unit and shall provide feedback to the controller so that the position of the override switch can be obtained through software. In addition each analog output shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.
5. Local Status Indicator Lamps:
 - a. Provide as a minimum LED indication of CPU status, Ethernet LAN status, and field bus status. For each output, provide LED indication of the value of the output (On/Off). For each

- output module provide an LED which gives a visual indication of whether any outputs on the module are manually overridden.
6. Real Time Clock (RTC):
 - a. Each NRC shall include a battery-backed, real time clock, accurate to 10 seconds per day. The RTC shall provide the following: time of day, day, month, year, and day of week. The system shall automatically correct for daylight savings time and leap years and be Year 2000 compliant.
 7. Power Supply:
 - a. The power supply for the NRCs shall be auto sensing, 24Vac/10-40Vdc power, with a tolerance of +/- 20%. Line voltage below the operating range of the system shall be considered outages. The controller shall contain over voltage surge protection, and require no additional AC power signal conditioning.
 8. Automatic Restart After Power Failure:
 - a. Upon restoration of power after an outage, the NRC shall automatically and without human intervention: update all monitored functions; resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
 9. Battery backup:
 - a. The NRC shall include an on-board battery to back up the controller's RAM memory. The battery shall provide accumulated backup of all RAM and clock functions for at least 30 days. In the case of a power failure, the NRC shall first try to restart from the RAM memory. If that memory is corrupted or unusable, then the NRC shall restart itself from its application program stored in its FLASH memory.
- C. Software Specifications
1. General:
 - a. The NRC shall contain FLASH memory to store both the resident operating system AND the application software. There will be no restrictions placed on the type of application programs in the system. Each NRC shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage, etc.
 2. User Programming Language:
 - a. The application software shall be user programmable. This includes all strategies, sequences of operation, control algorithms, parameters, and setpoints. The source program shall be English language-based and programmable by the user. The language shall be structured to allow for the easy configuration of control programs, schedules, alarms, reports, telecommunications, local displays, mathematical calculations, passwords, and histories. The language shall be self-documenting. Users shall be able to place comments anywhere in the body of a program. Program listings shall be configurable by the user in logical groupings.
 - b. Controllers that use a "canned" program method will not be accepted.
- D. Control Software:
1. The NRC shall have the ability to perform the following pre-tested control algorithms:
 2. Proportional, Integral plus Derivative Control (PID)
 3. Self-Tuning PID
 4. Two Position Control
 5. Digital Filter
 6. Ratio Calculator
 7. Equipment Cycling Protection
 8. Mathematical Functions:
 - a. Each controller shall be capable of performing basic mathematical functions (+, -, *, /), squares, square roots, exponential, logarithms, Boolean logic statements, or combinations of both. The controllers shall be capable of performing complex logical statements including operators such as >, <, =, and, or, exclusive or, etc. These must be able to be used in the same equations with the mathematical operators and nested up to five parentheses deep.

9. Energy Management Applications:
 - a. NRCs shall have the ability to perform any or all of the following energy management routines:
 - b. Time of Day Scheduling
 - c. Calendar Based Scheduling
 - d. Holiday Scheduling
 - e. Temporary Schedule Overrides
 - f. Optimal Start
 - g. Optimal Stop
 - h. Night Setback Control
 - i. Enthalpy Switchover (Economizer)
 - j. Peak Demand Limiting
 - k. CFM Tracking
 - l. Heating/Cooling Interlock
 - m. Free Cooling
 - n. Hot Water Reset
10. History Logging:
 - a. Each controller shall be capable of LOCALLY logging any input, output, calculated value or other system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system can be logged in history. A minimum of 1000 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.
11. Alarm Management:
 - a. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the NRC and can result in the display of one or more alarm messages or reports.
 - b. Up to 8 alarms can be configured for each point in the controller.
 - c. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided.
 - d. If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the NRC. When communications return, the alarm will be transmitted to the Operator Workstation if the point is still in the alarm. condition.
 - e. Alarms must be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet/IP protocol.
12. Local Keypad/Display:
 - a. For each NRC, provide a local display of at least 4 lines, providing current display of all critical inputs and outputs that the NRC is controlling. Provide a keypad such that an operator can log on, scroll through point values, and change setpoints that are changeable. The keypad/display must be capable of being mounted either on the controller, or on a control panel door.
13. 2.4.6 Embedded Web Server
14. Each NRC must have the ability to serve out customized web pages containing any desired I/O values from the entire BAS.

2.03 STANDALONE DIGITAL CONTROL UNITS (SDCUS)

- A. General:
 1. Standalone Digital Control Units shall provide control of HVAC and lighting, including air handling units, rooftop units, variable air volume boxes, unit ventilators, and other mechanical equipment. Each controller shall be fully programmable, contain its own control programs and will continue to operate in the event of a failure or communication loss to its associated NRC. Each SDCU provided must be a "native" BACnet device, supporting the BACnet Advanced Application Controller (B-AAC) profile. Controllers that support a lesser profile such as B-SA are not acceptable. SDCUs shall be tested and certified by the BACnet Testing Laboratory (BTL) as Advanced Application Controllers (B-AAC).

- B. Memory:
 - 1. Both the operating system of the controller, plus the application program for the controller, shall be stored in non-volatile, FLASH memory. Controllers shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory.
- C. Communication Ports:
 - 1. SDCUs shall have a RS-485 communication port to the BACnet MS/TP field bus, operating at a speed of at least 76.8kbps.
- D. Input/Output:
 - 1. Each SDCU shall have enough inputs and outputs to meet the application's required point count. Each SDCU shall support universal inputs, whereas any input may be software-defined as:
 - 2. Digital Inputs for status/alarm contacts
 - 3. Counter Inputs for summing pulses from meters.
 - 4. Thermistor Inputs for measuring temperatures in space, ducts and thermowells.
 - 5. Analog inputs for pressure, humidity, flow and position measurements.
 - 6. SDCU's must support both digital and analog output types:
 - 7. Digital Outputs for on/off equipment control.
 - 8. Analog Outputs for valve and damper position control, and capacity control of primary equipment.
- E. Expandability:
 - 1. For larger controllers (16 base inputs and up), provide input and output expansion through the use of plug-in modules. At least two I/O modules must be capable of being added to the base SDCU.
- F. Hardware Override Switches:
 - 1. All digital outputs on air handling unit controllers shall include three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall be built into the unit and shall provide feedback to the controller so that the position of the override switch can be obtained through software. In addition each analog output on air handling unit controllers shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.
- G. Room Sensor Support:
 - 1. The SDCU shall support a basic room thermistor in plain plastic cover; a room sensor with override and setpoint adjust slider; and, a sensor with a one-line display and 6-button keypad. The display sensor shall be able to display the current temperature, setpoint, outside air temperature, relative humidity and setpoint, occupancy mode, and CFM of the individual zone.
- H. Networking:
 - 1. Each SDCU will be able to exchange information on a peer to peer basis with other Standalone Digital Control Units, according to the BACnet MS/TP protocol. Each SDCU shall be capable of storing and referencing global variables (on the LAN) with or without any workstations online. Each SDCU shall be able to have its program viewed and/or enabled/disabled through a workstation connected to an NRC.
- I. Indicator Lamps:
 - 1. SDCUs will have as a minimum, LED indication of CPU status, and field bus status.
- J. Real Time Clock (RTC):
 - 1. All SDCUs shall have a real time clock in either hardware or software. The accuracy shall be within 10 seconds per day. The RTC shall provide the following information: time of day, day, month, year, and day of week. Each SDCU shall receive a signal, every hour, over the network from the NRC, which synchronizes all SDCU real time clocks.
- K. Automatic Restart After Power Failure:
 - 1. Upon restoration of power, the SDCU shall automatically and without human intervention, update all monitored functions, resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
- L. Battery Back Up:

1. All SDCUs shall store all programming in non-volatile FLASH memory. All SDCUs except terminal controllers shall include an on-board lithium battery to back up the controller's RAM memory. The battery shall have a shelf life of over 10 years, and provide accumulated backup of all RAM and clock functions for at least 3 years. In the case of a power failure, the SDCU shall first try to restart from the RAM memory. If that memory is corrupted or unusable, then the SDCU shall restart itself from its application program stored in its FLASH memory.
- M. Software - General.
1. The SDCU shall contain FLASH memory to store both the resident operating system AND the application software. There will be no restrictions placed on the type of application programs in the system. Each SDCU shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage, etc.
 - (n) User Programming Language:
 - A. The application software shall be user programmable, using the same language as that defined for Network Router/Controllers. Controllers that use a "canned" program method will not be accepted.
 - B. Control Software, Mathematical Functions, and Energy Management Applications must be identical to that which is provided with the Network Router/Controller.

2.03.15 HISTORY LOGGING:

- A. Each controller shall be capable of LOCALLY logging any input, output, calculated value or other system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system can be logged in history. A minimum of 1000 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.

2.04 ALARM MANAGEMENT:

- A. For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the SDCU and can result in the display of one or more alarm messages or reports.
- B. Up to 8 alarms can be configured for each point in the controller.
- C. Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided.
- D. If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the controller. When communications return, the alarm will be transmitted to the Operator Workstation if the point is still in the alarm condition.
- E. Alarms must be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet/IP protocol.

2.05 AIR HANDLER CONTROLLERS

- A. AHU Controllers shall conform to the BACnet Advanced Application Controller (B-AAC) device profile.
- B. AHU Controllers shall be capable of meeting the requirements of the sequence of operation found in the Execution portion of this specification and for future expansion.
- C. AHU Controllers shall support all the necessary point inputs and outputs as required by the sequence and operate in a standalone fashion.
- D. AHU Controllers shall be fully user programmable to allow for modification of the application software.
- E. A manual override switch shall be provided for all digital and analog outputs on the AHU Controller. The position of the switch shall be monitored in software and available for operator displays and alarm notification.
- F. Local Keypad/Display:

1. For each air handler SDCU, provide a local display of at least 4 lines, providing current display of all critical inputs and outputs that the SDCU is controlling. Provide a keypad such that an operator can log on, scroll through point values, and change setpoints that are changeable. The keypad/display must be capable of being mounted either on the controller, or on a control panel door.

PART 3 - BACNET GATEWAY TO THIRD-PARTY DEVICES

3.01 GENERAL:

- A. Where required, provide a BACnet Gateway to interface to non-BACnet systems that use the Modbus protocol, LONworks protocol, or other proprietary protocol. The Gateway shall communicate directly over Ethernet TCP/IP, and shall use the BACnet/IP protocol to communicate with a BACnet Workstation (B-OWS).

3.02 COMMUNICATION PORTS:

- A. In addition to its on-board Ethernet port, the Gateway shall have at least two serial communications ports for interfaces to third-party systems.

3.03 MEMORY:

- A. The Gateway shall have enough RAM memory to store all point configuration data, plus required history logging and alarm buffering. Minimum RAM shall be 8MB. The operating system of the gateway must be stored in FLASH non-volatile memory.

3.04 USER PROGRAMMING LANGUAGE:

- A. The Gateway shall employ the same user programmable application software that NRCs and SDCUs use.
- B. Control Software, Mathematical Functions, and Energy Management Applications must be identical to that which is provided with the Network Router/Controller. Gateways that do not have an application programming language will not be accepted.

3.05 HISTORY LOGGING:

- A. Each Gateway shall be capable of LOCALLY logging any input, output, calculated value or other system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system can be logged in history. A minimum of 1000 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.

3.06 OPERATOR WORKSTATION REQUIREMENTS

- A. General.
 1. The operator workstation portion of the BAS shall consist of one or more full-powered configuration and programming workstations, and one or more web-based operator workstations. For this project provide (qty) programming workstations and (qty) web-based user licenses.
 2. The programming and configuration workstation software shall be configurable as either a single workstation system (with a local database) or multi-workstation system where the database is located on a central file server. The client software on multi-workstation system shall access the file server database program via an Ethernet TCP/IP network running at 100MBPS.
 3. The web-based user interface software must be capable of expansion up to 100 concurrent users.
 4. All workstation software, both programming and software and web-based operator software, shall conform to the BACnet B-OWS device profile, using BACnet/IP to communicate to other BACnet devices.
 5. All configuration workstations shall be Pentium 4-based personal computers operating under the Microsoft Windows XP operating system. The application software shall be capable of communication to all Network Router/Controllers and Standalone Digital Control Units, feature high-resolution color graphics, alarming, reporting, and be user configurable for all data collection and data presentation functions.
 6. For multi-workstation systems, a minimum of 256 workstations shall be allowed on the Ethernet network along with the central file server. In this client/server configuration, any changes or

additions made from one workstation will automatically appear on all other workstations without the requirement for manual copying of files. Multi-workstation systems with no central database will not be acceptable. Multi-workstation systems with distributed/tiered file servers and a central (master) database will be acceptable.

- B. Administration/Programming Workstation Requirements (Single workstation or multi-workstation configuration).
 - 1. The workstation shall consist of the following:
 - 2. 3 GHz Pentium 4 processor with 4 GB of RAM
 - 3. Microsoft Windows 10 operating system
 - 4. Serial port, parallel port, USB port
 - 5. 10/100MBPS Ethernet NIC
 - 6. 500 GB hard disk
 - 7. CD-RW drive
 - 8. High resolution (minimum 1280 x 1024), 21" flat panel display
 - 9. Optical mouse and full function keyboard
 - 10. Audio sound card and speakers
 - 11. License agreement for all applicable software.
- C. File Server Hardware Requirements (if file server is shown on the drawings).
 - 1. The file server computer shall contain of the following:
 - 2. 3 GHz Pentium 4 processor with 5 GB of RAM
 - 3. Microsoft Windows 2000 Server[®] operating system
 - 4. 10/100MBPS Ethernet NIC
 - 5. 500 GB hard disk
 - 6. CD-RW drive
 - 7. High resolution (minimum 1024 x 768), 21" flat panel display
 - 8. Mouse, full function keyboard
 - 9. License agreement for all applicable software.
- D. Web-Based Operator PC Requirements
 - 1. Any user on the network can access the system, using the following software:
 - 2. Windows 10
 - 3. Internet Explorer 11 and above
 - 4. Java-enabled
- E. Modem
 - 1. Provide one Windows 10-compatible 56 Kbaud modem for dial-in diagnostics.
- F. Administration and Programming Workstation Software
 - 1. General Description
 - a. The software architecture must be object-oriented in design, a true 32-bit application suite utilizing Microsoft's OLE, COM, DCOM and ODBC technologies. These technologies make it easy to fully utilize the power of the operating system to share, among applications (and therefore to the users of those applications), the wealth of data available from the BAS.
 - b. The workstation functions shall include monitoring and programming of all DDC controllers. Monitoring consists of alarming, reporting, graphic displays, long term data storage, automatic data collection, and operator-initiated control actions such as schedule and setpoint adjustments.
 - c. Programming of controllers shall be capable of being done either off-line or on-line from any operator workstation. All information will be available in graphic or text displays. Graphic displays will feature animation effects to enhance the presentation of the data, to alert operators of problems, and to facilitate location of information throughout the DDC system. All operator functions shall be selectable through a mouse.
 - 2. System Database
 - a. The files server database engine must be Microsoft SQL Server, or another ODBC-compliant, relational database program. This ODBC (Open Database Connectivity)-compliant database

engine allows for an owner to write custom applications and/or reports which communicate directly with the database avoiding data transfer routines to update other applications. The system database shall contain all point configurations and programs in each of the controllers that have been assigned to the network. In addition, the database will contain all workstation files including color graphic, alarm reports, text reports, historical data logs, schedules, and polling records.

3. User Interface
 - a. The BAS workstation software shall allow the creation of a custom, browser-style interface linked to the user that has logged into the workstation software. This interface shall support the creation of "hot-spots" that the user may link to view/edit any object in the system or run any object editor or configuration tool contained in the software. Furthermore, this interface must be able to be configured to become a user's "PC Desktop" - with all the links that a user needs to run other applications. This, along with the Windows XP user security capabilities, will enable a system administrator to setup workstation accounts that not only limit the capabilities of the user within the BAS software but may also limit what a user can do on the PC and/or LAN/WAN. This might be used to ensure, for example, that the user of an alarm monitoring workstation is unable to shutdown the active alarm viewer and/or unable to load software onto the PC.
4. User Security
 - a. The software shall be designed so that each user of the software can have a unique username and password. This username/password combination shall be linked to a set of capabilities within the software, set by and editable only by, a system administrator. The sets of capabilities shall range from View only, Acknowledge alarms, Enable/disable and change values, Program, and Administer. The system shall allow the above capabilities to be applied independently to each and every class of object in the system. The system must allow a minimum of 256 users to be configured per workstation. There shall be an inactivity timer adjustable in software that automatically logs off the current operator after the timer has expired.
5. Configuration Interface
 - a. The workstation software shall use a familiar Windows Explorer-style interface for an operator or programmer to view and/or edit any object (controller, point, alarm, report, schedule, etc.) in the entire system. In addition, this interface shall present a "network map" of all controllers and their associated points, programs, graphics, alarms, and reports in an easy to understand structure. All object names shall be alphanumeric and use Windows long filename conventions.
 - b. The configuration interface shall also include support for template objects. These template objects shall be used as building blocks for the creation of the BAS database. The types of template objects supported shall include all data point types (input, output, string variables, setpoints, etc.), alarm algorithms, alarm notification objects, reports, graphics displays, schedules, and programs. Groups of template object types shall be able to be set up as template subsystems and systems. The template system shall prompt for data entry if necessary. The template system shall maintain a link to all "child" objects created by each template. If a user wishes to make a change to a template object, the software shall ask the user if he/she wants to update all of the child objects with the change. This template system shall facilitate configuration and programming consistency and afford the user a fast and simple method to make global changes to the BAS.
6. Color Graphic Displays
 - a. The system shall allow for the creation of user defined, color graphic displays for the viewing of mechanical and electrical systems, or building schematics. These graphics shall contain point information from the database including any attributes associated with the point (engineering units, etc.). In addition operators shall be able to command equipment or change setpoints from a graphic through the use of the mouse. Requirements of the color graphic subsystem include:
 - b. SVGA, bit-mapped displays. The user shall have the ability to import AutoCAD generated picture files as background displays.

- c. A built-in library of animated objects such as dampers, fans, pumps, buttons, knobs, gauges, ad graphs which can be “dropped” on a graphic through the use of a software configuration “wizard”. These objects shall enable operators to interact with the graphic displays in a manner that mimics their mechanical equivalents found on field installed control panels. Using the mouse, operators shall be able to adjust setpoints, start or stop equipment, modify PID loop parameters, or change schedules.
 - d. Status changes or alarm conditions must be able to be highlighted by objects changing screen location, size, color, text, blinking or changing from one display to another.
 - e. Ability to link graphic displays through user defined objects, alarm testing, or the result of a mathematical expression. Operators must be able to change from one graphic to another by selecting an object with a mouse - no menus will be required.
 - f. If separate, provide a copy of the full graphic editing software on each workstation.
7. Automatic monitoring
- a. The software shall allow for the automatic collection of data and reports from any controller through either a hardwire or modem communication link. The frequency of data collection shall be completely user-configurable.
8. Alarm Management
- a. The software shall be capable of accepting alarms directly from controllers, or generating alarms based on evaluation of data in controllers and comparing to limits or conditional equations configured through the software. Any alarm (regardless of its origination) will be integrated into the overall alarm management system and will appear in all standard alarm reports, be available for operator acknowledgment, and have the option for displaying graphics, or reports.
 - b. Alarm management features shall include:
 - c. A minimum of 255 alarm notification levels. Each notification level will establish a unique set of parameters for controlling alarm display, acknowledgment, keyboard annunciation, alarm printout and record keeping.
 - d. Automatic logging in the database of the alarm message, point name, point value, connected controller, timestamp, username and time of acknowledgement, username and time of alarm silence (soft acknowledgement)
 - e. Automatic printing of the alarm information or alarm report to an alarm printer or report printer.
 - f. Playing an audible beep or audio (wav) file on alarm initiation or return to normal.
 - g. Sending an email or alphanumeric page to anyone listed in a workstation’s email account address list on either the initial occurrence of an alarm and/or if the alarm is repeated because an operator has not acknowledged the alarm within a user-configurable timeframe. The ability to utilize email and alphanumeric paging of alarms shall be a standard feature of the software integrated with the operating system’s mail application interface (MAPI). No special software interfaces shall be required.
 - h. Individual alarms shall be able to be re-routed to a workstation or workstations at user-specified times and dates. For example, a critical high temp alarm can be configured to be routed to a Facilities Dept. workstation during normal working hours (7am-6pm, Mon-Fri) and to a Central Alarming workstation at all other times.
 - i. An active alarm viewer shall be included which can be customized for each user or user type to hide or display any alarm attributes.
 - j. The font type and color, and background color for each alarm notification level as seen in the active alarm viewer shall be customizable to allow easy identification of certain alarm types or alarm states.
 - k. The active alarm viewer can be configured such that an operator must type in text in an alarm entry and/or pick from a drop-down list of user actions for certain alarms. This ensures accountability (audit trail) for the response to critical alarms.
9. Custom Report Generation
- a. The software will contain a built-in custom report generator, featuring word processing tools for the creation of custom reports. These custom reports shall be able to be set up to automatically run or be generated on demand. Each workstation shall be able to associate

- reports with any word processing or spreadsheet program loaded on the machine. When the report is displayed, it will automatically spawn the associated report editor such as MS Word.
- b. Reports can be of any length and contain any point attributes from any controller on the network.
 - c. The report generator will have access to the user programming language in order to perform mathematical calculations inside the body of the report, control the display output of the report, or prompt the user for additional information needed by the report.
 - d. It shall be possible to run other executable programs whenever a report is initiated.
 - e. Report Generator activity can be tied to the alarm management system, so that any of the configured reports can be displayed in response to an alarm condition.
 - f. Standard reports shall include:
 - 1) Points in each controller.
 - 2) Points in alarm
 - 3) Disabled points
 - 4) Overridden points
 - 5) Operator activity report
 - 6) Alarm history log.
 - 7) Program listing by controller with status.
 - 8) Network status of each controller
10. Spreadsheet-style reports
- a. The software shall allow the simple configuration of row/column (spreadsheet-style) reports on any class of object in the system. These reports shall be user-configurable and shall be able to extract live (controller) data and/or data from the database. The user shall be able to set up each report to display in any text font, color and background color. In addition the report shall be able to be configured to filter data, sort data and highlight data which meets user-defined criteria.
11. HTML Reporting
- a. The above spreadsheet-style reports shall be able to be run to an HTML template file. This feature will create an HTML "results" file in the directory of the HTML template. This directory can be shared with other computer users, which will allow those users with access to the directory to "point" their web browser at the file and view the report.
12. Scheduling
- a. It shall be possible to configure and download from the workstation schedules for any of the controllers on the network.
 - b. Time of day schedules shall be in a calendar style and shall be programmable for a minimum of one year in advance. Each standard day of the week and user-defined day types shall be able to be associated with a color so that when the schedule is viewed it is very easy, at-a-glance, to determine the schedule for a particular day even from the yearly view. To change the schedule for a particular day, a user shall simply click on the day and then click on the day type.
 - c. Each schedule will appear on the screen viewable as the entire year, monthly, week and day. A simple mouse click shall allow switching between views. It shall also be possible to scroll from one month to the next and view or alter any of the schedule times.
 - d. Schedules will be assigned to specific controllers and stored in their local RAM memory. Any changes made at the workstation will be automatically updated to the corresponding schedule in the controller.
13. Programmer's Environment
- a. The programmer's environment will include access to a superset of the same programming language supported in the controllers. Here the programmer will be able to configure application software off-line (if desired) for custom program development, write global control programs, system reports, wide area networking data collection routines, and custom alarm management software. On the same screen as the program editor, the programming environment shall include dockable debug and watch bars for program debugging and viewing

updated values and point attributes during programming. In addition a wizard tool shall be available for loading programs from a library file in the program editor.

14. Saving/Reloading
 - a. The workstation software shall have an application to save and restore field controller memory files. This application shall not be limited to saving and reloading an entire controller - it must also be able to save/reload individual objects in the controller. This allows off-line debugging of control programs, for example, and then reloading of just the modified information.
 15. Data Logging
 - a. The workstation software shall have the capability to easily configure groups of data points with trend logs and display the trend log data. A group of data points shall be created by drag-and-drop method of the points into a folder. The trend log data shall be displayed through a simply menu selection, or from a hot spot on a graphic display. This data shall be able to be saved to file and/or printed.
 16. Audit Trail
 - a. The workstation software shall automatically log and timestamp every operation that a user performs at a workstation, from logging on and off a workstation to changing a point value, modifying a program, enabling/disabling an object, viewing a graphic display, running a report, modifying a schedule, etc.
 17. Fault Tolerant File Server Operation
 - a. The system shall provide the option to provide fault tolerant operation in the event of the loss of the CPU, disk drives, or other hardware required to maintain the operational integrity of the system. Operational integrity includes all user interfaces, monitoring of alarm points and access points, and executing access control functions.
 - b. The switchover mechanism provided shall be automatic. Should the failure be caused by hardware, then the system shall immediately switch to the Backup computer. Should the system failure be caused by software (instruction or data), the system shall not pass the faulted code to the Backup computer, otherwise the Backup shall fail in the same manner of the Primary computer.
 - c. Switchover to the Backup computer shall be initiated and effective (complete) in a manner and time frame that precludes the loss of event data, and shall be transparent to the system users, except for an advisory alarm message indicating that the switchover has occurred.
 - d. When the system fails-over from the Primary to the Backup computer, no alarm or other event shall be lost, and the Backup computer shall take control of all system functions.
 - e. A single component failure in the system shall not cause the entire system to fail. All system users shall be informed of any detectable component failure via an alarm event. System users shall not be logged off as a result of a system failure or switchover.
 - f. The Primary computer shall provide continual indication that the Backup computer is unavailable until such time that the fault has been purged.
- G. Web-based Operator Software
1. Day-to-day operation of the system shall be accessible through a standard web browser interface, allowing technicians and operators to view any part of the system from anywhere on the network. Access to the system must be available from a dial-in connection over the Internet.
 2. Graphic Displays
 - a. The browser-based interface must share the same graphical displays as the Administration and Programming Workstations, presenting dynamic data on site layouts, floor plans, and equipment graphics. The browser's graphics shall support commands to change setpoints, enable/disable equipment and start/stop equipment.
 - b. Through the browser interface, operators must be able to navigate through the entire system, and change the value or status of any point in any controller. Changes are effective immediately to the controller, with a copy stored in the system database.
 3. Alarm Management
 - a. Through the browser interface, a live alarm viewer identical to the alarm viewer on the Administration and Programming workstation shall be presented, if the user's password

allows it. Users must be able to receive alarms, silence alarms, and acknowledge alarms through a browser. If desired, specific operator text must be able to be added to the alarm record before acknowledgement.

4. Groups and Schedules
 - a. Through the browser interface, operators must be able to view pre-defined groups of points, with their values updated automatically.
 - b. Through the browser interface, operators must be able to change schedules - change start and stop times, and add new times to a schedule.
5. User Accounts and Audit Trail
 - a. The same user accounts shall be used for the browser interface and for the operator workstations. Operators must not be forced to memorize multiple passwords.
 - b. All commands and user activity through the browser interface shall be recorded in the system's activity log, which can be later searched and retrieved by user, date, or both.

3.07 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors

1. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of -30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.
2. Standard space sensors shall be available in an off white enclosure for mounting on a standard electrical box.
3. Where manual overrides are required, the sensor housing shall feature both an optional sliding mechanism for adjusting the space temperature setpoint, as well as a push button for selecting after hours operation.
4. Where a local display is specified, the sensor shall incorporate either an LED or LCD display for viewing the space temperature, setpoint and other operator selectable parameters. Using built in buttons, operators shall be able to adjust setpoints directly from the sensor.
5. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors are useable in air handling applications where the coil or duct area is less than 14 square feet.
6. Averaging sensors shall be employed in ducts which are larger than 14 square feet. The averaging sensor tube must contain at least one thermistor for every 3 feet, with a minimum tube length of 12 feet.
7. Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250 degrees F and 300 series stainless steel for all other applications.
8. A pneumatic signal shall not be allowed for sensing temperature.

B. Humidity Sensors

1. Humidity devices shall be accurate to +/- 5% at full scale for space and +/- 3% for duct and outside air applications. Suppliers shall be able to demonstrate that accuracy is NIST traceable.
2. Provide a hand held field calibration tool that both reads the output of the sensor and contains a reference sensor for ongoing calibration.

C. Pressure Sensors

1. Air pressure measurements in the range of 0 to 10" water column will be accurate to +/- 1% using a solid-state sensing element. Acceptable manufacturers include Modus Instruments and Mamac.
2. Differential pressure measurements of liquids or gases shall be accurate to +/- 0.5% of range. The housing shall be Nema 4 rated.

D. Current and KW Sensors

1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in solid and split core models, and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris or approved equal.
2. Measurement of three phase power shall be accomplished with a kW/kWH transducer. This device shall utilize direct current transformer inputs to calculate the instantaneous value (kW) and a pulsed

output proportional to the energy usage (kWH). Provide Veris Model 6000 Power Transducer or approved equal.

E. Flow Sensors

1. Provide an insertion vortex flowmeter for measurement of liquid, gas or steam flows in pipe sizes above 3 inches.
2. Install the flow meter on an isolation valve to permit removal without process shutdown.
3. Sensors shall be manufactured by EMCO or approved equal.

F. Control Valves

1. Provide automatic control valves suitable for the specified controlled media (steam, water or glycol). Provide valves which mate and match the material of the connected piping. Equip control valves with the actuators of required input power type and control signal type to accurately position the flow control element and provide sufficient force to achieve required leakage specification.
2. Control valves shall meet the heating and cooling loads specified, and close off against the differential pressure conditions within the application. Valves should be sized to operate accurately and with stability from 10 to 100% of the maximum design flow.
3. Trim material shall be stainless steel for steam and high differential pressure applications.
4. Electric actuation should be provided on all terminal unit reheat applications.

G. Dampers

1. Automatic dampers, furnished by the Building Automation Contractor shall be single or multiple blade as required. Dampers are to be installed by the HVAC Contractor under the supervision of the BAS Contractor. All blank-off plates and conversions necessary to install smaller than duct size dampers are the responsibility of the Sheet Metal Contractor.
2. Damper frames are to be constructed of 13 gauge galvanized sheet steel mechanically joined with linkage concealed in the side channel to eliminate noise as friction. Compressible spring stainless steel side seals, and acetal or bronze bearings shall also be provided.
3. Damper blade width shall not exceed eight inches. Seals and 3/8 inch square steel zinc plated pins are required. Blade rotation is to be parallel or opposed as shown on the schedules.
4. For high performance applications, control dampers will meet or exceed the UL Class I leakage rating.
5. Control and smoke dampers shall be Ruskin, or approved equal.
6. Provide opposed blade dampers for modulating applications and parallel blade for two position control.

H. Damper Actuators

1. Damper actuators shall be electronic, and shall be direct coupled over the shaft, without the need for connecting linkage. The actuator shall have electronic overload circuitry to prevent damage. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing. Non-spring return actuators shall have an external manual gear release to allow positioning of the damper when the actuator is not powered.

I. Smoke Detectors

1. Air duct smoke detectors shall be by Air Products & Controls or approved equal. The detectors shall operate at air velocities from 300 feet per minute to 4000 feet per minute.
2. The smoke detector shall utilize a photoelectric detector head.
3. The housing shall permit mechanical installation without removal of the detector cover.
4. The detectors shall be listed by Underwrites Laboratories and meet the requirements of UL 268A.

J. Airflow Measuring Stations

1. Provide a thermal anemometer using instrument grade self heated thermistor sensors with thermistor temperature sensors.
2. The flow station shall operate over a range of 0 to 5,000 feet/min with an accuracy of +/- 2% over 500 feet/min and +/- 10 ft/min for reading less than 500 feet/min.
3. The output signal shall be linear with field selectable ranges including 0-5 VDC, 0-10VDC and 4-20 mA.

PART 4 - EXECUTION

4.01 CONTRACTOR RESPONSIBILITIES

- A. General
 - 1. Installation of the building automation system shall be performed by the Contractor or a subcontractor. However, all installation shall be under the personal supervision of the Contractor. The Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor.
- B. Demolition
 - 1. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit, and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be disposed of by the Contractor.
- C. Access to Site
 - 1. Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner's Representative.
- D. Code Compliance
 - 1. All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations. Should any discrepancy be found between wiring specifications in Division 17 and Division 16, wiring requirements of Division 17 will prevail for work specified in Division 17.
- E. Cleanup
 - 1. At the completion of the work, all equipment pertinent to this contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this contract.

4.02 WIRING, CONDUIT, AND CABLE

- A. All wire will be copper and meet the minimum wire size and insulation class listed below:

WIRE CLASS	WIRE SIZE	ISOLATION CLASS
POWER	12 GAUGE	600 VOLT
CLASS ONE	14 GAUGE STD.	600 VOLT
CLASS TWO	18 GAUGE STD.	300 VOLT
CLASS THREE	18 GAUGE STD.	300 VOLT
COMMUNICATIONS	PER MFR.	PER MFR.

- A. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.
- B. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.
- C. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Set screw fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit sealoff fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.
- D. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.
- E. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square

with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.

- F. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire management system shall be in conduit.
- G. Fiber optic cable shall include the following sizes; 50/125, 62.5/125 or 100/140.
- H. Only glass fiber is acceptable, no plastic.
- I. Fiber optic cable shall only be installed and terminated by an experienced contractor. The BAS contractor shall submit to the Engineer the name of the intended contractor of the fiber optic cable with his submittal documents.

4.03 HARDWARE INSTALLATION

A. Installation Practices for Wiring

- 1. All controllers are to be mounted vertically and per the manufacturer's installation documentation .
- 2. The 120VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. This circuit will not feed any other circuit or device.
- 3. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.
- 4. Wires are to be attached to the building proper at regular intervals such that wiring does not droop. Wires are not to be affixed to or supported by pipes, conduit, etc.
- 5. Conduit in finished areas, will be concealed in ceiling cavity spaces, plenums, furred spaces and wall construction. Exception; metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.
- 6. Conduit, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.
- 7. Wires are to be kept a minimum of three (3) inches from hot water, steam, or condensate piping.
- 8. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.
- 9. Wire will not be allowed to run across telephone equipment areas.

B. Installation Practices for Field Devices

- 1. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.
- 2. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.
- 3. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.
- 4. Water line mounted sensors shall be removable without shutting down the system in which they are installed.
- 5. For duct static pressure sensors, the high pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low pressure port shall be left open to the plenum area at the point that the high pressure port is tapped into the ductwork.
- 6. For building static pressure sensors, the high pressure port shall be inserted into the space via a metal tube. Pipe the low pressure port to the outside of the building.

C. Enclosures

- 1. For all I/O requiring field interface devices, these devices where practical will be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure which protects the device(s) from dust, moisture, conceals integral wiring and moving parts.
- 2. FIPs shall contain power supplies for sensors, interface relays and contactors, and safety circuits.

3. The FIP enclosure shall be of steel construction with baked enamel finish, NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for twenty percent spare mounting space. All locks will be keyed identically.
4. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.
5. All outside mounted enclosures shall meet the NEMA-4 rating.
6. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

D. Identification

1. Identify all control wires with labeling tape or sleeves using either words, letters, or numbers that can be exactly cross-referenced with as-built drawings.
2. All field enclosures, other than controllers, shall be identified with a bakelite nameplate. The lettering shall be in white against a black or blue background.
3. Junction box covers will be marked to indicate that they are a part of the BAS system.
4. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with name plates.
5. All I/O field devices inside FIP's shall be labeled.

4.04 EXISTING CONTROLS.

- A. Existing controls which are to be reused must each be tested and calibrated for proper operation. Existing controls which are to be reused and are found to be defective requiring replacement, will be noted to the Owner. The Owner will be responsible for all material and labor costs associated with their repair.

4.05 CONTROL SYSTEM SWITCH-OVER

- A. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.
- B. Switch-over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over.
- C. The Contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame.

4.06 LOCATION

- A. The location of sensors is per mechanical and architectural drawings.
- B. Space humidity or temperature sensors will be mounted away from machinery generating heat, direct light and diffuser air streams.
- C. Outdoor air sensors will be mounted on the north building face directly in the outside air. Install these sensors such that the effects of heat radiated from the building or sunlight is minimized.
- D. Field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.

PART 5 - SOFTWARE INSTALLATION

5.01 GENERAL.

- A. The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software or other third party software necessary for successful operation of the system.

5.02 DATABASE CONFIGURATION.

- A. The Contractor will provide all labor to configure those portions of the database that are required by the points list and sequence of operation.

5.03 COLOR GRAPHIC DISPLAYS.

- A. Unless otherwise directed by the owner, the Contractor will provide color graphic displays as depicted in the mechanical drawings for each system and floor plan. For each system or floor plan, the display shall

contain the associated points identified in the point list and allow for setpoint changes as required by the owner.

5.04 REPORTS.

- A. The Contractor will configure a minimum of 6 reports for the owner as listed below:
 - 1. Central Plant Status Report
 - 2. Air Handler Status Report
 - 3. Energy Consumption Report
 - 4. Space Temperature Report
 - 5. Specialty Equipment Status Report

5.05 DOCUMENTATION

- A. As built software documentation will include the following:
 - 1. Descriptive point lists
 - 2. Application program listing
 - 3. Application programs with comments.
 - 4. Printouts of all reports.
 - 5. Alarm list.
 - 6. Printouts of all graphics

5.06 COMMISSIONING AND SYSTEM STARTUP

- A. Point to Point Checkout.
 - 1. Each I/O device (both field mounted as well as those located in FIPs) shall be inspected and verified for proper installation and functionality. A checkout sheet itemizing each device shall be filled out, dated and approved by the Project Manager for submission to the owner or owner's representative.
- B. Controller and Workstation Checkout.
 - 1. A field checkout of all controllers and front end equipment (computers, printers, modems, etc.) shall be conducted to verify proper operation of both hardware and software. A checkout sheet itemizing each device and a description of the associated tests shall be prepared and submitted to the owner or owner's representative by the completion of the project.

5.07 SYSTEM ACCEPTANCE TESTING

- A. All application software will be verified and compared against the sequences of operation. Control loops will be exercised by inducing a setpoint shift of at least 10% and observing whether the system successfully returns the process variable to setpoint. Record all test results and attach to the Test Results Sheet.
- B. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the owner.
- C. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the owner.
- D. Perform an operational test of each third party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

5.08 SEQUENCES OF OPERATION

- A. Boiler Control
- B. Single Zone Air Handlers

C. Fan Coil Control

END OF SECTION

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Equipment drains and overflows.
- D. Pipe hangers and supports.
- E. Unions, flanges, mechanical couplings, and dielectric connections.
- F. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Pressure independent temperature control valves and balancing valves.
- G. Flow controls.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9123 - Interior Painting.
- C. Section 23 0516 - Expansion Fittings and Loops for HVAC Piping.
- D. Section 23 0523 - General-Duty Valves for HVAC Piping.
- E. Section 23 0553 - Identification for HVAC Piping and Equipment.
- F. Section 23 0719 - HVAC Piping Insulation.
- G. Section 23 2114 - Hydronic Specialties.
- H. Section 25 3516 - Integrated Automation Sensors and Transmitters: Pipe-mounted product furnishing.
- I. Section 25 3519 - Integrated Automation Control Valves: Product furnishing.
- J. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.
- C. ASME B16.15 - Cast Copper Alloy Threaded Fittings Classes 125 and 250; 2013.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- F. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2013.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- J. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- M. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

- N. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).
- O. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C. Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Provide manufacturers catalog information.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 QUALITY ASSURANCE

- A. Welder Qualifications: Certify in accordance with ASME BPVC-IX.
 - 1. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Engineer.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
 - 2. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
 - 3. For shut-off and to isolate parts of systems or vertical risers, use gate, ball, or butterfly valves.

2.02 HEATING WATER PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 - 2. Threaded Joints: ASME B16.3, malleable iron fittings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.

- a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
 1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
 2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
 1. Fittings: ASTM D2466 or D2467, PVC.
 2. Joints: Solvent welded in accordance with ASTM D2855.

2.04 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 1. Dimensions and Testing: In accordance with AWWA C606.
 2. Mechanical Couplings: Comply with ASTM F1476.
 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.

2.06 BALL VALVES

- A. Manufacturers:
 1. Apollo Valves: www.apollovalves.com/#sle.
 2. Viega LLC: www.viega.us/#sle.
 3. or approved equal..
- B. Up To and Including 2 Inches:
 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.07 BUTTERFLY VALVES

- A. Manufacturers:
 1. Apollo Valves: www.apollovalves.com/#sle.
 2. or approved equal..
- B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- C. Disc: Construct of chrome plated ductile iron or stainless steel.
- D. Stem: Stainless steel with stem offset from the centerline to provide full 360-degree circumferential setting.
- E. Operator: 10 position lever handle.

2.08 PRESSURE INDEPENDENT TEMPERATURE CONTROL VALVES AND BALANCING VALVES

- A. Manufacturers:
 1. Danfoss; AB-QM Valve: www.danfoss.com/#sle.
 2. Schneider Electric: www.schneider-electric.us/#sle.
 3. or approved equal.
- B. Control Valves: Factory-fabricated pressure independent with internal differential pressure regulator (DPRV), which automatically adjusts to normal changes in system pressure and provides 100 percent control valve authority at all positions of the valve.

1. Provide control valve to incorporate control, balancing, and flow limiting. Hydronic system pressure independent control valve bodies to comply with ASME B16.34 or ASME B16.15 pressure and temperature class ratings based on the design operating temperature and 150 percent of the system design operating pressure and have the following characteristics:
 - a. 2 NPS and Smaller: Class 150 bronze or brass body with union connections, stainless steel trim, stainless steel rising stem, stainless steel disc or ball, and screwed ends with backseating capacity repackable under pressure.
 - b. 2-1/2 NPS and Larger: Class 125 iron or ductile iron body, stainless steel trim, stainless steel rising stem, stainless steel disc or ball, flanged ends with backseating capacity repackable under pressure.
 - c. Sizing: Line-size.
- C. Electronic Actuators: Direct-mounted, self-calibrating type designed for minimum 60,000 full-stroke cycles at rated force.
- D. Provide actuator with visible position indication. Fail positions on power failure to include in-place, open or closed as indicated in the controls specifications.

2.09 FLOW CONTROLS

- A. Manufacturers:
 1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 3. or approved equal..
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. See Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interference with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
- G. Slope piping and arrange to drain at low points.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 23 0516.
- I. Pipe Hangers and Supports:
 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
 3. Place hangers within 12 inches of each horizontal elbow.

4. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 23 0719.
- K. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100.
- L. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
- B. Hanger Spacing for Steel Piping.
1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
- C. Hanger Spacing for Plastic Piping.
1. 1/2 Inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
 2. 3/4 Inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
 3. 1 Inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.
 4. 2 Inches: Maximum span, 69 inches; minimum rod size, 3/8 inch.
 5. 3 Inches: Maximum span, 7 feet; minimum rod size, 3/8 inch.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Strainers.
- C. Balancing valves.
- D. Automatic flow control valves.
- E. Flow meters.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 - 2. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 3. Nexus Valve, Inc: www.nexusvalve.com/#sle.
 - 4. Taco, Inc: www.taco-hvac.com/#sle.
 - 5. or approved equal..
- B. Manual Air Vent: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Air Vent:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
- D. Maximum Fluid Pressure: 150 psi.
- E. Maximum Fluid Temperature: 250 degrees F.

2.02 STRAINERS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com/#sle.
 - 2. Nexus Valve, Inc: www.nexusvalve.com/#sle.
 - 3. or approved equal..
- B. Size 2 inch and Under:
 - 1. Provide threaded, grooved, or sweat brass or iron body for up to 175 psi working pressure, Y-pattern strainer with 1/32 inch stainless steel perforated screen.
- C. Install horizontally or vertically with strainer cleanout cap facing down.

2.03 BALANCING VALVES

- A. Manufacturers:
 - 1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 2. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 3. or approved equal..

- B. Size 2 inch and Smaller:
 - 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.

2.04 AUTOMATIC FLOW CONTROL VALVES

- A. Manufacturers:
 - 1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 2. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
 - 3. or approved equal..
- B. Construction:
 - 1. Brass, bronze, or iron body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
 - 2. Built-in lug-type outlet butterfly valve with 2-position handle.
- C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.
- D. Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.

2.05 FLOW METERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
 - 2. EMCO Flow Systems: www.emcoflow.com/#sle.
 - 3. or approved equal.
- B. Orifice principle by-pass circuit with direct reading gauge, soldered or flanged piping connections for 125 psi working pressure, with shut off valves, and drain and vent connections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Filter-driers.
- G. Solenoid valves.
- H. Expansion valves.
- I. Flexible connections.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 23 0719 - HVAC Piping Insulation.
- C. Section 23 0993 - Sequence of Operations for HVAC Controls.

1.03 REFERENCE STANDARDS

- A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers; 2005.
- B. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- C. AHRI 750 - Standard for Thermostatic Refrigerant Expansion Valves; 2007.
- D. AHRI 760 - Standard for Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.
- E. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.
- F. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2013.
- G. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.
- H. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- I. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- J. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.
- K. ASME B31.9 - Building Services Piping; 2014.
- L. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- N. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.
- O. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- Q. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with 1 unless indicated otherwise.

- C. Liquid Indicators:
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. If receiver is provided, install in liquid line leaving receiver.
 - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
 - 1. Use service valves on suction and discharge of compressors.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
 - 1. Use line size strainer upstream of each automatic valve.
- G. Filter-Driers:
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
 - 2. Use a filter-drier on suction line just ahead of compressor.
 - 3. Use sealed filter-driers in lines smaller than 1/2 inch outside diameter.
 - 4. Use sealed filter-driers in low temperature systems.
- H. Solenoid Valves:
 - 1. Use in liquid line of single or multiple evaporator systems.
- I. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- D. Test Reports: Indicate results of leak test, acid test.
- E. Submit welders certification of compliance with ASME BPVC-IX.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Filter-Driers:
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

2.02 REGULATORY REQUIREMENTS

- A. Comply with ASME B31.9 for installation of piping system.

2.03 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Copper Tube to 7/8-inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
 - 1. Fittings: ASME B16.26 cast copper.
 - 2. Joints: Flared.
- C. Pipe Supports and Anchors:
 - 1. Provide hangers and supports that comply with MSS SP-58.
 - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Vertical Support: Steel riser clamp.

5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.04 REFRIGERANT

- A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

2.05 MOISTURE AND LIQUID INDICATORS

- A. Indicators: Single port type, UL listed, with copper or brass body, flared or soldered ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.06 VALVES

- A. Diaphragm Packless Valves:
1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, soldered or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- B. Ball Valves:
1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.
- C. Service Valves:
1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or soldered ends, for maximum pressure of 500 psi.

2.07 STRAINERS

- A. Straight Line or Angle Line Type:
1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.08 FILTER-DRIERS

- A. Construction: UL listed.
1. Sealed Type: Copper shell.
 2. Connections: As specified for applicable pipe type.

2.09 SOLENOID VALVES

- A. Valve: AHRI 760 I-P, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, soldered, or threaded ends; for maximum working pressure of 500 psi.
- B. Coil Assembly: UL 429, UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

2.10 EXPANSION VALVES

- A. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with nonreplaceable capillary tube and remote sensing bulb and remote bulb well.
- B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.11 ELECTRONIC EXPANSION VALVES

- A. Valve:
1. Brass body with flared or soldered connection, needle valve with floating needle and machined seat, stepper motor drive.
- B. Evaporation Control System:

1. Electronic microprocessor based unit in enclosed case, proportional integral control with adaptive superheat, maximum operating pressure function, preselection allowance for electrical defrost and hot gas bypass.
- C. Refrigeration System Control: Electronic microprocessor based unit in enclosed case, with proportional integral control of valve, on/off thermostat, air temperature alarm (high and low), solenoid valve control, liquid injection adaptive superheat control, maximum operating pressure function, night setback thermostat, timer for defrost control.

2.12 FLEXIBLE CONNECTORS

- A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
 1. Install in accordance with ASME B31.5.
 2. Support horizontal piping as indicated.
 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 4. Place hangers within 12 inches of each horizontal elbow.
- G. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- H. Provide clearance for installation of insulation and access to valves and fittings.
- I. Insulate piping and equipment.
- J. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

3.03 FIELD QUALITY CONTROL

- A. Test refrigeration system in accordance with ASME B31.5.

3.04 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ducts.
- B. Flexible ducts.
- C. Metal ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 23 0713 - Duct Insulation: External insulation and duct liner.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2013.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- I. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.
- J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.
- K. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.
- L. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fitting types, gauges, sizes, welds, and configuration.
- D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.
- C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts.

- D. Duct Shape and Material in accordance with Allowed Static Pressure Range:
- E. Duct Sealing and Leakage in accordance with Static Pressure Class:
- F. Duct Fabrication Requirements:
 - 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
 - 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
 - 3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
 - 4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
 - 5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
 - 6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
 - 7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
- G. Ducts: Galvanized steel, unless otherwise indicated.
- H. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

2.04 METAL DUCTS

- A. Material Requirements:
 - 1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Connectors, Fittings, Sealants, and Miscellaneous:
 - 1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
 - 2. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - b. VOC Content: Not more than 250 g/L, excluding water.
 - c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- C. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.

1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
- D. Kitchen Cooking Hood and Grease Exhaust: Nominal 3 inches thick ceramic fiber insulation between 20 gage, 0.0375 inch, Type 304 stainless steel liner and 24 gage, 0.0239 inch aluminized steel sheet outer jacket.
 1. Tested and UL listed for use with commercial cooking equipment in accordance with NFPA 96.
 2. Certified for zero clearance to combustible material in accordance with:
 - a. UL 2221 with a 2 hour rating.
 3. Materials and construction of the modular sections and accessories to be in accordance with the terms of the following listings:
 - a. UL 1978.
 - b. UL 2221.

2.05 FLEXIBLE DUCTS

- A. Flexible Air Ducts:
 1. UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound spring steel wire.
 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 3. Pressure Rating: From 10 in-wc positive to 1 in-wc negative.
 4. Maximum Velocity: 4,000 fpm.
 5. Temperature Range: Minus 20 to 210 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- D. Flexible Ducts: Connect to metal ducts with mechanical fastener.
- E. Duct sizes indicated are inside precise dimensions. For lined ducts, maintain sizes inside lining.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
- H. Use double nuts and lock washers on threaded rod supports.
- I. Duct Insulation: Provide duct insulation in compliance with Section 23 0713.

3.02 CLEANING

- A. Clean thoroughly each duct system as indicated within Section 23 0130.51.
- B. Clean the duct system and force air at high velocity through the duct to remove accumulated dust. Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Combination fire and smoke dampers.
- B. Combination fire and smoke dampers - corridor dampers.
- C. Duct test holes.
- D. Flexible duct connectors.
- E. Volume control dampers.

1.02 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.
- C. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- D. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- B. Provide factory sleeve and collar for each damper.
- C. Multiple Blade Dampers: Fabricate with 16 gauge, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- D. Operators: UL listed and labeled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
- E. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.
- F. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.02 COMBINATION FIRE AND SMOKE DAMPERS - CORRIDOR DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- B. Provide factory sleeve and collar for each damper.
- C. Multiple Blade Dampers: Fabricate with 16 gauge, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- D. Operators: UL listed and labeled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
- E. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.

- F. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.03 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.04 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.

2.05 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
 - 1. Blade: 24 gauge, 0.0239 inch, minimum.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 - 1. Blade: 18 gauge, 0.0478 inch, minimum.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 3100 for duct construction and pressure class.
- B. Provide duct test holes where indicated and required for testing and balancing purposes.
- C. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- E. Demonstrate re-setting of fire dampers to Owner's representative.
- F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

END OF SECTION

SECTION 23 3600
AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Unit Ventilators.

1.02 RELATED REQUIREMENTS

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- B. Section 23 2113 - Hydronic Piping: Connections to heating coils.
- C. Section 23 2114 - Hydronic Specialties: Connections to heating coils.
- D. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; 2001 (R2011).
- B. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2011 with Addendum 1.
- C. ASHRAE Std 62.1 - Laboratory Method of Testing to Determine the Sound Power in a Duct; 2013.
- D. ASHRAE Std 130 - Methods of Testing Air Terminal Units; 2008 (R2014).
- E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- I. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.
- J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate airflow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
 - 1. Include schedules listing discharge and radiated sound power level for each of the second through sixth-octave bands at inlet static pressures of 1 to 4 in-wc.
- D. Certificates: Certify that coils are tested and rated in accordance with AHRI 410.
- E. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

- B. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 UNIT VENTILATORS

- A. Manufacturers:
1. Trane, a brand of Ingersoll Rand: www.trane.com.
 2. Daikin.
 3. MagicAire
 4. LG
 5. or approved equal.
- B. General:
1. Factory-assembled and wired, AHRI 880 (I-P) rated, horizontal fan-powered terminal unit with blower, blower motor, mixing plenum, and primary air damper contained in a single unit housing.
- C. Unit Casing:
1. Minimum 22 gauge, 0.0299 inch galvanized steel.
 2. Color choices to be submitted and chosen by District
 3. Primary Air Inlet Collar: Suitable for standard flexible duct sizes.
 4. Acceptable Liners:
 - a. 1/2 inch thick, coated, fibrous-glass complying with ASTM C1071.
 - 1) Secure with adhesive.
 - 2) Coat edges exposed to airstream with NFPA 90A approved sealant.
 - 3) Cover liner with non-porous foil.
- D. Primary Air Damper Assembly:
1. Heavy-gauge, galvanized steel, or extruded aluminum construction with solid shaft rotating in bearings.
 2. Provide indicator on damper shaft or alternative method for indicating damper position over full range of 90 degrees.
 3. Incorporate low leak (2 percent) damper blades for tight airflow shutoff.
 4. Fan(s): Forward curved, centrifugal type.
 5. Fan Motor:
 - a. ECM (Electrically Commutated Motor):
 - b. Fan motor shaft directly connected to fan and isolated from unit casing to prevent transmission of vibration.
- E. DX Coil for VRV - HP Operation
- F. Hot Water Heating Coil:
1. Coil Casing: Minimum 22 gauge, 0.0299 inch galvanized steel, factory-installed on terminal unit with flanged discharge for attachment to downstream ductwork.
 2. Heavy-gauge aluminum fins, mechanically bonded to tubes.
 3. Copper Tubes: 0.016 inch minimum wall thickness with male solder header connections.
 4. Coil leak tested to minimum 305 psig.
 5. Base performance data on tests run in accordance with AHRI 410.
- G. Electrical Requirements:
1. Single-point power connection.
 2. Equipment wiring to comply with requirements of NFPA 70.
- H. Controls:
1. DDC (Direct-Digital Controls): All new equipment is to be integrated into the existing BMS system.
 - a. Room Sensor: Tie into existing BMS system
 - 1) Compatible with existing temperature controls.
 - 2) Wall-mounted, system powered, with temperature set-point adjustment including connection access for portable operator terminal.

2. Control Sequence: See Section 23 0993.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Connect to ductwork in accordance with Section 23 3100.
- C. Verify that electric power is available and of the correct characteristics.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.

3.04 CLEANING

- A. Vacuum clean coils and inside of units.
- B. Install new filters.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals for closeout submittals.

3.06 SCHEDULES

- A. Fan-Powered Air Terminal Unit:
- B. See Schedule on drawings

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
- B. Rectangular ceiling diffusers.
- C. Registers/grilles:
 - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

PART 2 PRODUCTS

2.01 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square, adjustable pattern, stamped, multi-core and square and rectangular, adjustable pattern diffuser to discharge air in four way pattern .
- B. Connections: Round.
- C. Frame: Provide surface mount and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Steel with baked enamel finish.
- E. Color: White.

2.02 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Type: Egg crate style face consisting of 1/2 x 1/2 x 1/2 inch grid core.
- B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
- C. Color: White
- D. Frame: Channel lay-in frame for suspended grid ceilings.
- E. Accessories: Provide prescored molded fiberglass back

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black, see Section 09 9123.

END OF SECTION

SECTION 23 7416

PACKAGED ROOFTOP UNITS / OUTDOOR AIR HANDLING UNITS

PART 1 - GENERAL

1.01 GENERAL DESCRIPTION

- A. This section includes the design, controls, and installation requirements for packaged rooftop units/ outdoor air handling units.

1.02 QUALITY ASSURANCE

- A. Packaged air-cooled condenser units shall be certified in accordance with ANSI/AHRI Standard 340/360 performance rating of commercial and industrial unitary air-conditioning and heat pump equipment.
- B. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.
- C. Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.
- D. Unit Energy Efficiency Ratio (EER) shall be equal to or greater that prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
- E. Unit shall be safety certified by ETL and ETL US listed. Unit nameplate shall include the ETL/ETL Canada label.

1.03 SUBMITTALS

- A. Product Data: Literature shall be provided that indicates dimensions, operating and shipping weights, capacities, ratings, fan performance, filter information, factory supplied accessories, electrical characteristics and connection requirements. Installation, Operation, and Maintenance manual with startup requirements shall be provided.
- B. Shop Drawings: Unit drawings shall be provided that indicate assembly, unit dimensions, construction details, clearances and connection details. Computer generated fan curves for each fan shall be submitted with specific design operation point noted. Wiring diagram shall be provided with details for both power and control systems and differentiate between factory installed and field installed wiring.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Unit shall be shipped with doors screwed shut and outside air hood closed to prevent damage during transport and thereafter while in storage awaiting installation.
- B. Follow Installation, Operation, and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.
- C. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation, and Maintenance manual.

1.05 WARRANTY

- A. Manufacturer shall provide a limited “parts only” warranty for a period of 12 months from the date of equipment startup or 18 months from the date of original equipment shipment from the factory, whichever is less. Warranty shall cover material and workmanship that prove defective, within the specified warranty period, provided manufacturer’s written instructions for Installation, Operation, and maintenance have been followed. Warranty excludes parts associated with routine maintenance, such as belts and filters.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Products shall be provided by the following manufacturers:
 - 1. AAON
 - 2. Substitute equipment may be considered for approval that includes at a minimum:
 - a. R-410A refrigerant
 - b. Variable capacity compressor with 10-100% capacity control
 - c. Direct drive supply fans
 - d. Double wall cabinet construction

- e. Insulation with a minimum R-value of 13
- f. Stainless steel drain pans

2.02 ROOFTOP UNITS

A. General Description

1. Packaged rooftop unit shall include compressors, evaporator coils, filters, supply fans, dampers, air-cooled condenser coils, condenser fans, hot water coils, exhaust fans, and unit controls.
2. Unit shall be factory assembled and tested including leak testing of the DX coils, leak testing of the hot water coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the service compartment's literature pocket.
3. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
4. Unit components shall be labeled, including hot water pipe stub outs, refrigeration system components, and electrical and controls components.
5. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
6. Installation, Operation, and Maintenance manual shall be supplied within the unit.
7. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's hinged access door.
8. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's hinged access door.

B. Construction

1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D1929-11 for a minimum flash ignition temperature of 610°F.
3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, reduces heat transfer through the panel, and prevents exterior condensation on the panel.
4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
5. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
6. Access to filters, dampers, cooling coils, compressors, and electrical and controls components shall be through hinged access doors with quarter turn, zinc cast, lockable handles. Full length stainless steel piano hinges shall be included on the doors.
7. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
8. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
9. Unit shall be provided with base discharge and return air openings. All openings through the base pan of the unit shall have upturned flanges of at least 1/2 inch in height around the opening.
10. Unit shall include lifting lugs on the top of the unit.

C. Electrical

1. Unit shall be provided with standard power block for connecting power to the unit.
2. Unit shall have a 5kAIC SCCR.
3. Unit shall be provided with a factory installed and factory wired 115V, 12 amp GFI outlet disconnect switch in the unit control panel.

D. Supply Fans

1. Unit shall include direct drive, unhooded, backward curved, plenum supply fans.
2. Blowers and motors shall be dynamically balance and mounted on rubber isolators.
3. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
4. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

E. Exhaust Fans

1. Exhaust dampers shall be sized for 100% relief.
2. Fans and motors shall be dynamically balanced.
3. Unit shall include barometric relief dampers.
4. Motors shall be premium efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points.
5. Access to exhaust fans shall be through double wall, hinged access doors with quarter turn lockable handles.
6. Variable frequency drives shall be factory wired and mounted in the unit. Fan motors shall be premium efficiency.

F. Cooling Coils

1. Evaporator Coils
 - a. Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
 - b. Coil shall be standard capacity.
 - c. Coils shall be hydrogen or helium leak tested.
 - d. Coils shall be furnished with factory installed expansion valves.

G. Refrigeration System

1. Unit shall be factory charged with R-410A refrigerant.
2. Compressors shall be scroll type with thermal overload protection and carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.
3. Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.
4. Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
5. Each refrigeration circuit shall be equipped with expansion valve type refrigerant flow control.
6. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides and a factory installed liquid line filter driers.
7. Unit shall include a variable capacity scroll compressor on the refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
8. The factory installed controls shall include a 3 minute off delay timer to prevent compressor short cycling. The controls shall also include an adjustable, 20 second delay timer for each additional capacity stage to prevent multiple capacity stages from starting simultaneously and adjustable compressor lock out.
9. Condensers
 - a. Air-Cooled Condenser
 - 1) Condenser fans shall be a vertical discharge, axial flow, direct drive fans.
 - 2) Coils shall be designed for use with R-410A refrigerant. Coils shall be multi-pass and fabricated from aluminum microchannel tubes.
 - 3) Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.
 - 4) Coils shall be hydrogen or helium leak tested.

10. Heating Coils
 - a. Hot Water Heating Coils
 - 1) Coils shall be certified in accordance with AHRI Standard 410 and be hydrogen or helium leak tested.
 - 2) Coils shall be constructed of copper tubes with aluminum fins mechanically bonded to the tubes and galvanized steel end casings. Fin design shall be sine wave rippled.
 - 3) Coils shall be one row, half serpentine circuitry, and 12 fins per inch.
 - 4) Coils shall be located in the reheat position downstream of the cooling coil.
 - 5) Control valves shall be field supplied and field installed.
11. Filters
 - a. Unit shall include 4 inch thick, pleated panel filters with an ASHRAE MERV rating of 13, upstream of the cooling coil. Unit shall also include 2 inch thick, pleated panel pre filters with an ASHRAE MERV rating of 8, upstream of the 4 inch standard filters.
 - b. Unit shall include a Magnehelic gauge mounted in the controls compartment.
12. Outside Air/Economizer
 - a. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 20 cfm of leakage per sq ft. at 4 in. w.g. air pressure differential across the damper. Low leakage dampers shall be Class 2 AMCA certified, in accordance with AMCA Standard 511. Damper assembly shall be controlled by spring return enthalpy activated fully modulating actuator. Unit shall include outside air opening bird screen, outside air hood, and relief dampers.
13. Controls
 - a. Factory Installed and Factory Provided Controller
 - 1) Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory installed in the unit controls compartment and factory tested. Controller shall be capable of standalone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
 - 2) Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
 - 3) Controller shall include non-volatile memory to retain all programmed values without the use of a battery, in the event of a power failure.
 - 4) Constant Volume Controller
 - (a) Unit shall modulate cooling with constant airflow to meet space temperature cooling loads.
 - (b) Unit shall modulate heating with constant airflow to meet space temperature heating loads. Modulating heating capacity shall modulate based on supply air temperature.
 - 5) Unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling shall be accomplished with connection to interface module with LCD screen and input keypad, interface module with touch screen, or with connection to PC with free configuration software. Controller shall be capable of connection with other factory installed and factory provided unit controllers with individual unit configuration, setpoint adjustment, sensor status viewing, and occupancy scheduling available from a single unit. Connection between unit controllers shall be with a modular cable. Controller shall be capable of communicating and integrating with a LonWorks or BACnet network. [Orion Controls System]

2.03 CURBS

1. Curbs shall be fully gasketed between the curb top and unit bottom with the curb providing full perimeter support, cross structure support and air seal for the unit. Curb gasket shall be furnished within the control compartment of the rooftop unit to be mounted on the curb immediately before mounting of the rooftop unit.

2. Knockdown curb (with duct support rails) shall be factory furnished for field assembly.
3. Solid bottom curb shall be factory assembled and fully lined with curb rated 1 inch fiberglass insulation and include a wood nailer strip. (Curb shall be adjustable up to 3/4 inch per foot to allow for sloped roof applications.)

PART 3 - EXECUTION

3.01 INSTALLATION, OPERATION, AND MAINTENANCE

1. Installation, Operation, and Maintenance manual shall be supplied with the unit.
2. Installing contractor shall install unit, including field installed components, in accordance with Installation, Operation, and Maintenance manual instructions.
3. Start up and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

END OF SECTION

SECTION 23 8113
PACKAGED TERMINAL AIR-CONDITIONERS

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Air conditioning units.
- B. Cabinet.
- C. Evaporator fan.
- D. Compressor.
- E. Evaporator coil.
- F. Condenser.
- G. Heating coil.
- H. Air filters.
- I. Controls.

2.02 RELATED REQUIREMENTS

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment: Evaporator and condenser fan motors.
- B. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

2.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

2.04 SUBMITTALS

- A. Product Data: Provide data for manufactured products and assemblies. Indicate water, drain, thermostatic valves, and electrical rough-in connections with electrical characteristics and connection requirements.
- B. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

2.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. Amana
- B. Daikin Industries Co, Ltd: www.daikin.com/#sle.
- C. Friedrich Air Conditioning Co: www.friedrich.com/#sle.
- D. Trane Inc: www.trane.com/#sle.
- E. or approved equal..

3.02 AIR CONDITIONING UNITS

- A. Description: Packaged, self-contained, factory assembled, prewired unit, consisting of cabinet, compressor, condensing coil, evaporator fan, evaporator coil, discharge plenum, wall sleeve, louver, outside air connection, heating coil, air filters, and controls; fully charged with refrigerant and filled with oil.
- B. Assembly: Up flow air delivery, in draw-through configuration as indicated.

C. Energy Efficiency:

3.03 CABINET

- A. Frame and Panels: Galvanized steel with baked enamel finish, easily removed access doors or panels with quick fasteners.
- B. Insulation: Minimum 1/2 inch thick acoustic duct liner for lining cabinet interior.
- C. Drain Pan: Galvanized steel with corrosion-resistant coating.
- D. Hydronic cabinet to cover unit's plastic casing.

3.04 EVAPORATOR FAN

- A. Fan: Direct drive, double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, resiliently mounted.

3.05 COMPRESSOR

- A. Hermetically sealed, 3600 rpm maximum, resiliently mounted with positive lubrication and internal motor protection.

3.06 EVAPORATOR COIL

- A. Direct expansion coiling coil of seamless copper or aluminum tubes expanded into aluminum fins.
- B. Refrigeration circuit with externally equalized thermal expansion valve, filter-drier, and charging valves.

3.07 CONDENSER

- A. Co-Axial: Copper tube in copper tube or shell and tube with finned copper tubes in steel shell with water temperature actuated water regulating valve.
- B. Fan: Double width, double inlet, forward curved centrifugal fan, statically and dynamically balanced, with permanently lubricated bearings.

3.08 HEATING COIL

- A. Hot water heating coil of seamless copper tubes expanded into aluminum fins.

3.09 AIR FILTERS

3.10 CONTROLS

- A. Factory wired controls shall include contactor, high and low pressure cutouts, internal winding thermostat for compressor, control circuit transformer, non-cycling reset relay.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Pipe condensate from drain pan as indicated.

4.02 SCHEDULES

- A. See schedule on drawings.

END OF SECTION

SECTION 23 8129
VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refrigerant piping.
- B. Indoor units.
- C. Variable refrigerant volume HVAC system includes:
 - 1. Outdoor/condensing unit(s).
 - 2. Indoor/evaporator units.
 - 3. Refrigerant piping.
 - 4. Control panels.
 - 5. Control wiring.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping: Condensate drain piping.
- B. Section 23 0800 - Commissioning of HVAC.
- C. Section 23 2300 - Refrigerant Piping.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.
- B. AHRI 1230 - Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment; 2021.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- D. ITS (DIR) - Directory of Listed Products; current edition.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings indicated in Contract Documents:
 - 1. Outdoor Units:
 - a. Refrigerant Type and Size of Charge.
 - b. Output and Input Cooling Capacity: Btu/h.
 - c. Output and Input Heating Capacity: Btu/h.
 - d. Cooling Input Power: Btu/h.
 - e. Heating Input Power: Btu/h.
 - f. Operating Temperature Range, Cooling and Heating.
 - g. Fan Capacity: Flow in cfm with respective fan curves.
 - h. Fan Curves.
 - i. External Static Pressure (ESP): In-wc.
 - j. Sound Pressure Level: dB(A).
 - k. Electrical Data: Complete including motor size.
 - 1) Maximum Circuit Amps (MCA).
 - 2) Maximum Fuse Amps (MFA).
 - 3) Maximum Starting Current (MSC).
 - 4) Full Load Amps (FLA).

- 5) Total Over Current Amps (TOCA).
- 6) Fan Motor: HP.
- l. Weight and Dimensions.
- m. Maximum number of indoor units that can be served.
- n. Maximum refrigerant piping run from outdoor unit to indoor unit(s).
- o. Maximum height difference between outdoor unit to Indoor unit(s), both above and below.
- p. Control Options.
2. Indoor Units:
 - a. Output and Input Cooling Capacity: Btu/h.
 - b. Output and Input Heating Capacity: Btu/h.
 - c. Cooling Input Power: Btu/h.
 - d. Heating Input Power: Btu/h.
 - e. Fan Capacity: Flow in cfm with respective fan curves.
 - f. Fan Curves.
 - g. External Static Pressure (ESP): In-wc.
 - h. Sound Pressure level: dB(A).
 - i. Electrical Data: Complete including motor size.
 - 1) Maximum Circuit Amps (MCA).
 - 2) Maximum Fuse Amps (MFA).
 - 3) Maximum Starting Current (MSC).
 - 4) Full Load Amps (FLA).
 - 5) Total Over Current Amps (TOCA).
 - 6) Fan Motor: HP.
 - j. Maximum Lift of Built-in Condensate Pump.
 - k. Weight and Dimensions.
 - l. Control Options.
3. Control Panels: Complete data of controllers, input-output points, and zones.
- C. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
 1. Detailed piping diagrams, with branch balancing devices.
 2. Detailed power wiring diagrams.
 3. Detailed control wiring diagrams.
 4. Drawings required by manufacturer.
- D. Operating and Maintenance Data:
 1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
 2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
 3. Identification of replaceable parts and local source of supply.
- E. Warranty: Executed warranty, made out in Owner's name.
- F. Specimen Warranty: Copy of manufacturer's warranties.
- G. Project Record Documents: Record the following:
 1. As-installed routing of refrigerant piping and condensate piping.
 2. Locations of access panels.
 3. Locations of control panels.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Trained and approved by manufacturer of equipment.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Compressors: Provide manufacturer's warranty for 6 years from date of installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: The system design indicated in Contract Documents is based on equipment and system designed by Daikin AC; www.daikinac.com/#sle.

2.02 HVAC SYSTEM DESIGN

- A. System Operation: Cooling only.
 - 1. Provide a complete functional system that achieves the specified performance based on the specified design conditions and that is designed and constructed according to the equipment manufacturer's requirements.
 - 2. Conditioned spaces are indicated on drawings.
 - 3. Outdoor/Condenser unit locations are indicated on drawings.
 - 4. Indoor/Evaporator unit locations are indicated on drawings.
 - 5. Required equipment unit capacities are indicated on drawings.
 - 6. Refrigerant piping sizes are not indicated on drawings.
 - 7. Connect equipment to condensate piping provided by others; condensate piping is indicated on drawings.
- B. Cooling Mode Interior Performance:
 - 1. Daytime Setpoint: 68 degrees F, plus or minus 2 degrees F.
 - 2. Setpoint Range: 57 degrees F to 77 degrees F.
 - 3. Night Setback: 78 degrees F.
 - 4. Interior Relative Humidity: 20 percent, maximum.
- C. Refrigerant Piping Lengths: Provide equipment capable of serving system with following piping lengths without any oil traps:
 - 1. Minimum Piping Length from Outdoor/Central Unit(s) to Furthest Terminal Unit: 540 feet, actual; 620 feet, equivalent.
 - 2. Total Combined Liquid Line Length: 3280 feet, minimum.
 - 3. Minimum Piping Length Between Indoor Units: 49 feet.
- D. Control Wiring Lengths:
 - 1. Between Outdoor/Condenser Unit and Indoor/Evaporator Unit: 6,665 feet, minimum.
 - 2. Between Outdoor/Condenser Unit and Central Controller: 3,330 feet, minimum.
 - 3. Between Indoor/Evaporator Unit and Remote Controller: 1,665 feet.
- E. Controls: Provide the following control interfaces:
 - 1. For Each Indoor/Evaporator Unit: One wall-mounted wired "local" controller, with temperature sensor; locate where indicated.
- F. Local Controllers: Wall-mounted, wired, containing temperature sensor.

2.03 VARIABLE REFRIGERANT FLOW SYSTEM

- A. Minimum System Requirements:
 - 1. System Testing, Capacity Rating, and Performance:
 - a. AHRI 1230 when cooling capacity is equal or greater than 65,000 Btu/h.
 - b. AHRI 210/240 when cooling capacity is below 65,000 Btu/h.
 - 2. Safety Certification: Bear UL 1995 tested and ITS (DIR) listed certification label.
 - 3. Outdoor Units: Furnish installation and surface support hardware products in accordance with ASCE 7 for wind restraint.

4. Cooling Mode Interior Performance:
 - a. Daytime Setpoint: 68 degrees F, plus or minus 2 degrees F.
 - b. Setpoint Range: 57 degrees F to 77 degrees F.
 - c. Night Setback: 78 degrees F.
 - d. Interior Relative Humidity: 20 percent, maximum.
- B. All Units: Factory assembled, wired, and piped and factory tested for function and safety.
 1. Refrigerant: R-410A.
 2. Performance Certification: AHRI Certified; www.ahrinet.org.
 3. Safety Certification: Tested to UL 1995 by UL or Intertek-ETL, listed in ITS (DIR), and bearing the certification label.
 4. Provide units capable of serving the zones indicated.
 5. Energy Efficiency: Report EER and COP based on tests conducted at "full load" in accordance with AHRI 210/240 or alternate test method approved by U.S. Department of Energy.
- C. Electrical Characteristics:
 1. Power - Indoor Units: 208 to 230 Volts, single phase, 60 Hz.
 2. 208-230 Voltage Range: 187 to 253 volts.
- D. Refrigerant Piping:
 1. Insulate each refrigerant line individually between the condensing and indoor units.

2.04 REFRIGERANT PIPING

- A. Two-Pipe Run: Provide low-pressure vapor and high-pressure vapor gas pipes for each indoor unit selected for seasonal heating or cooling service.
- B. Three-Pipe Run: Provide low-pressure vapor, high-pressure vapor gas, and liquid pipes for each indoor unit selected for off-season heating and cooling changeover service.
- C. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.

2.05 OUTDOOR/CONDENSING UNITS

- A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
 1. Refrigeration Circuit: Scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 2. Refrigerant: Factory charged.
 3. Variable Volume Control: Modulate compressor capacity automatically to maintain constant suction and condensing pressures while varying refrigerant volume to suit heating/cooling loads.
 4. Capable of being installed with wiring and piping to the left, right, rear or bottom.
 5. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle (cooling mode) oil return or defrost is not permitted, due to potential reduction in space temperature.
 6. Sound Pressure Level: As specified, measured at 3 feet from front of unit; provide night setback sound control as a standard feature; three selectable sound level steps of 55 dB, 50 dB, and 45 dB, maximum.
 7. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
 8. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
 9. Provide refrigerant sub-cooling to ensure the liquid refrigerant does not flash when supplying to us indoor units.

10. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.
11. Controls: Provide contacts for electrical demand shedding.
- B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
 1. Designed to allow side-by-side installation with minimum spacing.
- C. Fans: One or more direct-drive propeller type, vertical discharge, with multiple speed operation via DC (digitally commutating) inverter.
 1. Provide minimum of 2 fans for each condensing unit.
 2. External Static Pressure: Factory set at 0.12 in WG, minimum.
 3. Indoor Mounted Air-Cooled Units: External static pressure field set at 0.32 in WG, minimum; provide for mounting of field-installed ducts.
 4. Fan Airflow: As indicated for specific equipment.
 5. Fan Motors: Factory installed; permanently lubricated bearings; inherent protection; fan guard; output as indicated for specific equipment.
- D. Condenser Coils: Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.
- E. Compressors: Scroll type, hermetically sealed, variable speed inverter-driven and fixed speed in combination to suit total capacity; minimum of one variable speed, inverter driven compressor per condenser unit; minimum of two compressors per condenser unit; capable of controlling capacity within range of 6 percent to 100 percent of total capacity.
 1. Multiple Condenser Modules: Balance total operation hours of compressors by means of duty cycling function, providing for sequential starting of each module at each start/stop cycle, completion of oil return, and completion of defrost, or every 8 hours.
 2. Failure Mode: In the event of compressor failure, operate remaining compressor(s) at proportionally reduced capacity; provide microprocessor and associated controls specifically designed to address this condition.
 3. Provide each compressor with crankcase heater, high pressure safety switch, and internal thermal overload protector.
 4. Provide oil separators and intelligent oil management system.
 5. Provide spring mounted vibration isolators.

2.06 INDOOR UNITS

- A. Minimum Unit Requirements:
 1. DX Evaporator Coil:
 - a. Copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
 - b. 2-, 3-, or 4-row cross fin design with 14 to 17 fins per inch and flare end-connections.
 - c. Provide thermistor on liquid and gas lines wired into local controller.
 - d. Refrigerant circuits factory-charged with dehydrated air for field charging.
 2. Fan Section:
 - a. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
 - b. Thermally protected, direct-drive motor with statically and dynamically balanced fan blades.
 - c. Minimum-adjustable external static pressure 0.32 in-wc; provide for mounting of field-installed ducts.
 3. Local Unit Controls:
 - a. Temperature Control: Return air control using thermistor tied to computerized Proportional-Integral-Derivative (PID) control of superheat.
 - b. Temperature Zones:
 - 1) Single Indoor Unit: Set served space(s) as the local temperature zone.
 - 2) Multiple Indoor Units: For large zones, group and coordinate related indoor units with served spaces as the local temperature zone with each indoor unit as sub-zone.

4. Return Air Filter:
 5. Condensate:
 - a. Built-in condensate drain pan with PVC drain connection for drainage.
 - b. Units With Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.
 - c. Units Without Built-In Condensate Pump: Provide built-in condensate float switch and wiring connections.
 6. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.
- B. All Indoor/Evaporator Units: Factory assembled and tested DX fan-coil units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
1. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
 2. Temperature Control Mechanism: Return air thermistor and computerized Proportional-Integral-Derivative (PID) control of superheat.
 3. Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
 - a. Provide thermistor on liquid and gas lines.
 4. Fans: Direct-drive, with statically and dynamically balanced impellers; high and low speeds unless otherwise indicated; motor thermally protected.
 5. Return Air Filter: Washable long-life net filter with mildew proof resin, unless otherwise indicated.
 6. Condensate Drainage: Built-in condensate drain pan with PVC drain connection.
 7. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that required electrical services have been installed and are in the proper locations prior to starting installation.
- B. Notify Engineer if conditions for installation are unsatisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install refrigerant piping in accordance with equipment manufacturer's instructions.
- C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).
- D. Coordinate with installers of systems and equipment connecting to this system.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.
- B. Adjust equipment for proper operation within manufacturer's published tolerances.

3.04 CLEANING

- A. Clean exposed components of dirt, finger marks, and other disfigurements.

3.05 COMMISSIONING

- A. See Section 01 9113 - General Commissioning Requirements for additional requirements.
- B. Execute mechanical system commissioning as indicated on Section 23 0800.
- C. Execute BAS, SCADA, or other linked integration automation system commissioning as indicated on Section 25 0800.
- D. Perform the following Functional Tests:
- E. Replace components not functioning properly.

3.06 INSPECTION

- A. As required, a representative of the manufacturer shall be contacted by the contractor to inspect and certify the installation of the VRF system. Any fee or cost pertaining to this inspection is the

responsibility of the contractor. Submit a statement letter from the manufacturer as required in the closeout activities section (238129-3.06-C).

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals for additional submittals.
- B. See Section 01 7900 - Demonstration and Training for additional requirements.
- C. Submit one of the following:
 - 1. Statement letter from manufacturer's representative stating their approval of the entire VRF system as installed by contractor following an on site inspection. Letter must contain the following:
 - a. Approval statement by manufacturer.
 - b. Name of manufacturer.
 - c. Name of manufacturer's representative.
 - d. Manufacturer's contact information.
 - e. Job location.
 - f. Owner's representative.
 - g. Name of installer's company.
 - h. Name of installer's representative.
 - i. Installer's contact information.
 - 2. Statement letter from manufacturer's representative stating that an inspection of the VRF installation is not required by the manufacturer and will not prevent the system equipment from being warrantied.
- D. Demonstrate proper operation of all system components to Owner's designated representative.
- E. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Briefly describe function, operation, and maintenance of each component.
- F. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Location: At project site.
 - 4. Provide and submit to Engineer a sign-in sheet for instructors and Owner's representative(s). Submit with Closeout Submittals.

3.08 PROTECTION

- A. Protect installed components from subsequent construction operations.
- B. Replace exposed components broken or otherwise damaged beyond repair.

3.09 MAINTENANCE

- A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

END OF SECTION

SECTION 26 0000

GENERAL PROVISIONS - ELECTRICAL CONTRACTOR

PART 1 - GENERAL

1.01 DOCUMENTS

- A. All work in this Division is subject to the provisions of the General Conditions and specifications of the "General Requirements" for project.
- B. The Contractor shall refer to the General Conditions and the General Requirements and shall abide by same as integral to this Contract.
- C. Thoroughly study drawings of other trades (Architectural, Structural, Plumbing, etc.). Contractor has performed this review and accepts responsibility for coordination of the work with that shown for other trades.
- D. Drawings and specifications are complementary when relating to electrical work. Where a discrepancy occurs between drawings and technical specifications, the conflict is to be brought to the attention of the Engineer.
- E. The Engineer shall be the sole source for interpretation of the Contract documents relating to electrical items.

1.02 SCOPE

- A. The scope of work shall include, but not be limited to, the following:
 - 1. Provide new breakers in existing panels.
 - 2. Provide all conduit, wiring and boxes for work indicated.
 - 3. All cover plates, receptacle covers, switch covers and blank plates to be metal. All exposed plates to be stainless steel. Plastic will not be permitted.
 - 4. Include in this bid the cost of all labor, materials, tools, transportation, equipment, insurances, taxes (where applicable), benefits, temporary protection, permits, and all necessary and miscellaneous items required to provide the various systems shown and described, complete and in good operating condition, whether or not all miscellaneous items are specifically described in these specifications or shown on the drawings. This Contractor shall install all work in accordance with applicable codes and shall prepare additional coordination drawings and/or shop drawings as necessary to obtain approval of governing bodies having jurisdiction over this project, or as directed by the Engineer.

1.03 DEFINITIONS

- A. The terms hereinafter defined apply only to the work described in Division 26.
- B. "Provide" means to deliver and install, including all labor and material for approved operation.
- C. "Furnish", "Supply", or "Deliver" means to deliver to the job site location, unload, and set in a location determined by the Engineer, as required without installation.
- D. "Install" means to mount and make approved operating connections no matter who provides the related systems, equipment, or devices.
- E. "Equal", "Approved Equal", or "Equal as Approved" means equal in the opinion of or approved as equal by the Engineer.
- F. "Approved", "Acceptable", or "Satisfactory" means the Engineer's acceptance of a finished work or stated part thereof.
- G. "Substantial, Completion" means that point in time when the Engineer determines that the electrical systems are complete to a point to where the Owner can take occupancy and beneficial use of the apparatus. This may be independent from the substantial completion of other portions or the complete scope of the entire project.
- H. "Start of Warranty" means that point in time when the Owner accepts the installation after being certified as complete by the Engineer. A written confirmation of this date will be required to inform the Owner

that the warranty on equipment is to begin. The start date of warranties may differ for differing pieces of equipment if in the opinion of the Engineer it is in the Owner's interest to do so.

- I. "Removal" means to disconnect, unhook, remove, and dispose of the referenced item to include dismantling of conduit, removing of existing wires back to a safe point as determined by the Engineer, and dismantling of any support structure which remains.

1.04 CODES, REGULATIONS, AND STANDARDS

- A. Materials furnished and/or installed under this specification shall conform with applicable requirements of codes, regulations, and standards described herein or otherwise in affect. Any material that is substandard to any if the following shall not be installed, but any material exceeding such requirements shall be used when specified or shown.
- B. All materials and equipment installed shall comply with standards of:
 1. National Fire Protection Agency (NFPA)
 2. Local Utilities
 3. Owner's Insurance Underwriters
 4. Applicable Government Agencies and Departments
 5. Underwriters Laboratory (UL)
 6. Federal and State Occupational Safety and Health Act (OSHA)
 7. Local Municipality
 8. Local Fire Department
 9. Americans with Disabilities Act
- C. Equipment standards shall be as follows, unless otherwise specified:
 1. Lighting - UL, IES
 2. Motors - NEMA Standards, UL listed, USA Standard 50
 3. Switches - UL, NEMA
 4. Panel boards and breakers - UL
 5. Wire - UL, NEC
- D. Contractor shall also be bound by any local ordinance or regulation, which has jurisdiction over this work.

1.05 PERMITS AND FEES

- A. It shall be the responsibility of this Contractor to obtain all permits and pay all fees required by any agency having jurisdiction over this project. This shall include, but not be limited to, electrical permits, fees for inspections, and fees required upon submission of drawings for approval by local agencies.

1.06 QUALITY ASSURANCE

- A. Install all work true to line and grade, parallel and close to walls, and as direct as feasible while maintaining maximum head room. Do not install work across windows, doors, or other openings.
- B. Disconnect switches, transformers, panel boards, starters, and all other equipment shall be accessible for operation, service, or maintenance.
- C. The Engineer may stop the use of any materials or equipment not complying with the drawings or specifications, and may instruct the Contractor to replace all substandard work or materials at no cost to the Owner.
- D. All equipment and systems shall operate under all specified loads without sound or vibration, which is objectionable to the Engineer. Such conditions shall be corrected in an approved manner before the related installation will be accepted.
- E. All equipment and materials shall be new and without blemish or defects.
- F. All equipment of one type (such as switchboards, panels, starters, disconnects, etc.) shall be the products of one manufacturer.

1.07 EXAMINATION OF PREMISES AND DRAWINGS

- A. Before submitting proposal:

1. Examine all drawings and specifications relating to work of all other trades to determine scope and relation to other work.
 2. Examine all existing conditions affecting compliance with plans and specifications by visiting site and/or building.
 3. Ascertain access to site, available storage, and delivery facilities.
- B. Before commencing work:
1. Verify all governing dimensions at site and/or building.
 2. Inspect all adjacent work.

1.08 OBSTACLES, INTERFERENCE, AND COORDINATION

- A. General Requirements
1. Plans show general design arrangement. Install work substantially as indicated. Verify exact location and elevations on the job. **DO NOT SCALE PLANS.**
 2. Due to small scale of drawings, it is not possible to indicate all offsets, fittings, or changes in elevations. Adjust installation of conduit, equipment locations, etc. to accommodate work with obstacles and interference encountered as part of Contract.
- B. Interference
1. Thoroughly coordinate work with all other Contractors and determine exact route or location of each conduit or piece of equipment prior to installation. Maintain maximum headroom wherever possible and obtain special approval before installing any work below 7'-0" clear headroom in mechanical or electrical spaces. Install work so that all equipment is serviceable and operable.
 2. Should details, field conditions, changes in equipment, or shop drawing information necessitate an important rearrangement, report same to Engineer and obtain approval before proceeding.
 3. Do not install conduit, J-Boxes, electrical devices, equipment below HVAC equipment which needs to be replaced for maintenance, i.e., heat pump, air handling unit, in-line pump, etc.
- C. Roughing
1. Before roughing for equipment furnished by others, obtain approved rough drawings and exact location for each piece of equipment. Do not "rough-in" services without approved drawings.
 2. Obtain drawings or proper information giving final location of all motor and control connections.
 3. Unless otherwise detailed or specified:
 - a. All services shall be concealed in wall above ceilings, etc.
 - b. Work shall be exposed only where approved by the Engineer.
 - c. Notify Engineer if work cannot be concealed, as intended.
 - d. Branch circuits and feeders shall not be installed under floor slab, unless noted on drawings.
- D. Coordination with Other Drawings
1. Review all construction drawings, and if necessary request of other Contractors shop drawings to coordinate work. If conflict occurs between electrical drawings and/or other construction drawings, advise Engineer in writing before installation and act in accordance with the Engineer's direction.
- E. It is the responsibility of this Contractor and not the Engineer to coordinate the installation of all work in the field.
- F. If it should be necessary to remove and/or relocate any material or equipment that has been installed without the proper investigations or coordination with the work of other Contractors, such materials or equipment shall be removed and relocated without any additional cost to the Owner.

1.09 STRUCTURAL LIMITATIONS

- A. This Contractor shall be responsible for any damage to any new or existing structure or contents thereof, due to overloading as a result of his work or under his direction. If the Contractor has any doubt about the ability of the structure to withstand his loads, he is to submit the question in writing to the Engineer for a written response.

1.10 SCHEDULING AND PROCEDURE OF WORK

- A. The Contractor, immediately after being awarded the Contract, shall prepare and submit to the Engineer an estimated progress schedule for the work. Such schedules shall indicate the dates for starting and

completion of significant stages of construction and shall be kept current during the execution of the work. The format shall be in accordance with Division 1, "General Requirements".

- B. The Contractor shall provide and maintain such qualified personnel and equipment as necessary to perform the work in accordance with the progress schedule. It shall be the responsibility of this Contractor to maintain his schedule so as to not to delay the progress of the project or the schedules of other Contractors.
- C. Prior to performing any work in an existing structure, the Contractor shall obtain the approval of the Owner to cut into existing circuits.

1.11 SHOP DRAWINGS

- A. Refer to the technical sections hereinafter in Division 26 for items which require submission of shop drawings for review by the Engineer.

1.12 SUBMITTAL OF EQUIPMENT AND MATERIALS

- A. Refer to the technical section hereinafter in Division 26 for items which require submission of catalog cuts or descriptive literature.
- B. The Contractor shall submit the quantity of equipment catalog cuts or descriptive literature as required by Division 1, "General Requirements".
- C. For the items so listed, cuts or literature shall be marked to indicate the following:
 - 1. Function of the equipment to be furnished
 - 2. Picture of unit
 - 3. Ratings, dimensions, and service clearances
 - 4. Arrangement to be furnished
 - 5. Electrical or other power characteristics
 - 6. Data sheets of accessories to be furnished
 - 7. Operating weight of each equipment unit
 - 8. Designation of item as shown on the drawings
- D. Use equipment of one manufacturer and type for all similar applications, unless otherwise specified.

1.13 SUBCONTRACTORS

- A. Unless otherwise stated in Division 1, the Contractor shall submit a list of subcontractors for the Engineer's information. Included shall be the subcontractor's address and phone number.
- B. All provisions of this Contract shall apply equally to the Contractor, his subcontractors, second tier subcontractors, and/or suppliers.

1.14 SUBSTITUTIONS

- A. The Engineer shall be the sole judge for determining if a submitted product is "EQUAL" to the named manufacturer(s) in the technical specifications.
- B. Equipment substituted for that of the first named manufacturer must conform to the space requirements shown on the drawing. Any substituted equipment that cannot meet space requirements shall be replaced at the Contractor's expense. Any modifications of related systems (electrical, piping, ductwork, etc.) caused by a substitution shall be made at the Contractor's expense.
- C. The cost of redesign for any building component necessitated by the substitution of equipment for the first named in the technical specifications of Division 26 shall be borne by the Contractor making such substitution and shall be included as part of his bid.
- D. Acceptance of substituted equipment by the Engineer does not relieve the Contractor from meeting all requirements of Division 26.
- E. Substitution of equipment, systems, etc., requiring approval of local authorities must comply with such regulations and shall be filed for approval at the expense of Contractor (should filing be necessary). The Contractor, in offering substitutions, shall hold the Owner and Engineer harmless if the substituted item is an infringement of a patent held by the specified manufacturer.

1.15 CONTRACTOR SUPERVISION

- A. The Electrical Contractor shall assign one or more competent supervisors who shall:
 - 1. Have authority to accept and execute orders or instructions from the Engineer. Such orders or instructions shall constitute due notice when confirmed in writing.
 - 2. Cooperate with the other Contractors, subcontractors, the Engineer, and the Owner in all matters to avoid conflicts and delays.
 - 3. Make necessary decisions relating to all aspects of Division 26.

1.16 TEMPORARY SERVICES

- A. Design for temporary services shall be the responsibility of the designated Contractors. The Engineer shall not be liable for any design or approval of temporary services.

1.17 SLEEVES AND CHASES

- A. Provide sleeves for conduits, bus-ducts, and wireways passing through floors, walls, partitions, ceilings, and roofs of new or existing buildings, unless otherwise shown in the drawings.
- B. Circular sleeves in new construction shall be 22-gauge or heavier, galvanized iron or preformed plastic, filled with sand or other suitable material to maintain their shapes and prevent distortion during construction operations.
- C. Large square or rectangular openings shall be formed with lumber, plastic, or 22-gauge galvanized iron to the dimensions required. Forms shall be suitably braced or filled with sand to prevent distortion during construction operations.
- D. Provide cast iron sleeves with water step flanges when conduit or wireway is required to pass through walls or floors in contact with earth or water, except where below the lowest floor level.
- E. All sleeves, chases, and openings shall be located and sized by the Contractor whose work must penetrate the building elements, but shall not exceed a dimension of 1" beyond each side of the conduit, wireway, or bus-duct shown on the drawings.
- F. Sleeves shall be equal in length to the depth of construction. In waterproof floor construction, sleeves shall extend a maximum of 2" above finished floor level.

1.18 PROTECTION OF MATERIALS AND EQUIPMENT

- A. All material and equipment is, and shall remain, the property of each Contractor or subcontractor until accepted by the Owner or approved for payment. Any loss or damages prior to that time shall be replaced or repaired at no cost to the Owner.
- B. Each Contractor and subcontractor shall diligently:
 - 1. Protect all material and equipment against loss or damage by corrosion, the weather, other trades, foreign matter, or theft.
 - 2. Keep his material and equipment stored in an orderly manner where it will not interfere with other work.
 - 3. Move his material or equipment to a new location at his own expense if its presence interferes with other work.
- C. Any material or equipment damaged or corroded may be rejected by the Engineer as unacceptable and shall be replaced at no cost to the Owner.

1.19 SUPPORTS AND ANCHOR BOLTS

- A. After thoroughly investigating architectural, structural, mechanical, and electrical Contract drawings and shop drawings related to how and where equipment is to be supported, the Contractor shall provide:
 - 1. Necessary framing, bolts, inserts, stands, brackets, or other items required for proper support
 - 2. Supporting accessories, where required, whether shown or not
- B. Supports shall be rigid enough to prevent any movement of the mounted equipment and shall be acceptable to the Engineer.
- C. The use of wooden supports shall be unacceptable, unless prior approval of the Engineer is obtained.

- D. Anchor bolts, where required, shall be the length and diameter as shown on the drawings. Anchor bolts shall be set or drilled into concrete pads or walls and shall be protected during construction to prevent damage to threads. The layout pattern of all anchors required for electrical equipment shall be the responsibility of this Contractor. Anchor bolts, washers, and nuts shall all be Type 304 stainless steel, unless otherwise approved by the Engineer.

1.20 PAINTING

- A. It is the responsibility of this Contractor to provide painting for the following items:
1. Touchup of factory finishes applied to equipment or devices furnished under this Contract.
 2. Prime painting of all hangers, rods, channels, supports, or anchors required to support electrical equipment or pipe.
 3. Exposed electrical items not provided with a factory finish such as conduits, access panels, and similar items. Paint to match adjacent finished surfaces, unless otherwise directed. Painting is not required for exposed items adjacent to architectural surfaces that are specified or scheduled to remain unfinished.
 4. Paint exposed rigid conduit.
- B. Wash exposed metal with solvent prior to applying primer.
- C. Prime painting shall be accomplished by painting the surface with modified alkyd rust-inhibitive primer similar to Tnemec 10-99 gray or approved equal.
- D. Finish coat shall be acrylic semigloss enamel, color by Engineer.
- E. Do NOT paint HVAC equipment, factory finishes, concealed pipings, equipment labels, fusible links, or identification labeling on pipes.
- F. Environmental Requirements:
1. Comply with manufacturer's recommendations for environmental conditions under which paint and paint systems shall be applied.
 2. Ensure adequate ventilation during interior painting.
 3. Do not apply finish in areas in which open flames or welding are used, or where dust is being generated.
 4. Do not apply exterior paint in rain, fog or mist, or when temperature is below 45°F.
 5. Do not use spraying equipment inside existing occupied facilities without the Owner's written prior approval. When spraying is performed, provide adequate protection against damage to adjacent surfaces by over spray and fallout.
- G. Protection: Provide barriers and post signs as necessary to protect newly applied finishes.
- H. Submit Material Safety Data sheets for each type and manufacturer of paint to be used on this project.

1.21 IDENTIFICATION

- A. Provide identification of equipment and systems in accordance with the following schedule:
1. Panel boards - Identify all lighting or power panels on the interior surface of the door with an engraved plastic nameplate, fastened to the surface with two flat head sheet metal screws. Designation shall match that shown on the drawings. Install a typed directory of the breakers in the pocket provided.
 2. Transformers, contactors, disconnect switches - Identify with an engraved plastic nameplate fastened to the front of the device with two flat head sheet metal screws.
 3. Buried conduit - On the top of the sand bed, place a continuous fabric marker, made of plastic or other non-destructible material, with the words "CAUTION -ELECTRICAL WIRES".
- B. All nameplates shall be a minimum of 1" x 3" lamicoid signs, white with black letters, a minimum of 1/4" high. Plates shall have mastic on the back and two screw holes for mounting hardware.

1.22 TESTING

- A. Testing procedures for each piece of equipment, apparatus, or system shall be as stated in the technical sections of Division 26.

- B. All costs associated with testing and verifying electrical equipment operation shall be borne by the Contractor, including water, power, independent agency fees, wages, and expenses of manufacturer representative, and standby labor.
- C. All tests shall be performed by the Contractor in the presence of the Engineer. A five-(5) day notice to the Engineer concerning scheduled tests shall be required of the Contractor.
- D. At the completion of each test, a written report or documentation shall be prepared by the Contractor or his agent and forwarded to the Engineer for this evaluation and acceptance.
- E. No system, equipment, or installation shall be accepted for use by the Owner until all specified testing has been accomplished to the satisfaction of the Engineer.

1.23 CLEANING

- A. Prior to acceptance by the Owner, all new equipment, material, conduit, wireway, bus-duct, or other item provided under Division 26 shall be swept, vacuumed, or wiped clean by the Contractor and left in good condition. This shall include, but not be limited to, horizontal ledges, conduit, tops of bus-duct, tops of equipment, interiors of enclosures such as control cabinets or panel enclosures, transformers, control devices, disconnects, starters, motor control centers, and instruments. In addition, all light fixture lenses shall be cleaned on the inside and outside and left in spotless condition.
- B. Failure to perform this cleanup in a timely manner will result in the work being done by the Owner with the resultant cost deducted from the Contract amount.

1.24 OPERATING INSTRUCTIONS

- A. At the time of occupancy by the Owner, whether partially or totally, the Contractor shall provide to the Engineer, three (3) copies of operating and maintenance data, bound into hard cover binders with the Contractor's name and project description affixed to the front cover. Manuals shall be divided into sections by equipment with each section identified by a tab index.
- B. For each piece of equipment provided under Division 26, the following data shall be included:
 - 1. Manufacturer's printed instructions for installation, operation, maintenance, and replacement parts
 - 2. Wiring diagrams
 - 3. Lubrication charts and instructions, including a list of oils and greases
 - 4. Equipment test reports
 - 5. Shop drawings, when required by the technical specifications
 - 6. Manufacturer's material or equipment guarantees, made out to the Owner
 - 7. Fuse sizes
 - 8. Inspection reports
 - 9. Copies of record submittals, when required by the specifications

1.25 START-UP

- A. The Contractor shall be responsible to schedule all start-up of all electrical equipment and assume all associated costs, including wages and expenses of manufacturer's representatives.
- B. Where required by the technical specifications, the Manufacturer's authorized representative shall be present at the time of equipment start-up and shall be responsible for conducting all tests and certifying the results.
- C. After all systems have been started and checked out by the Contractor, the Engineer shall be notified by the Contractor that his tests are complete and the Engineer can begin his inspection and verification procedures. The Contractor shall provide whatever labor and material is necessary to aid the Engineer in completing this task.
- D. After verification by the Engineer that the installation is acceptable and can be transferred to the Owner, the Contractor shall provide the services of qualified people to instruct the Owner's representative or custodial force in the operation of each partial or complete system or piece of equipment. Advance notice of at least 48 hours shall be given to the Owner and Engineer prior to the scheduling of this instruction period. The Engineer reserves the right to postpone acceptance of any equipment for which the Owner has not received instructions.

1.26 GUARANTEES

- A. The provision of Division 1, "General Requirements", shall apply to all items specified in Division 26.
- B. It is understood that the Contractor shall immediately respond to all calls from the Owner or Engineer to correct any deficiencies found during the guarantee period and shall immediately correct them at no cost to the Owner.
- C. It is also understood that certain maintenance items are not part of the guarantee and are the Owner's responsibility during the first year. These include but are not limited to:
 - 1. Lubrication of rotating parts
 - 2. Cleaning of light fixture lenses
 - 3. Adjustment of transformer taps
 - 4. Scheduling of operating times
 - 5. Replacement of blown fuses, unless associated with equipment failure during warranty period.
- D. If, in the opinion of the Engineer, a Contractor's callback is the result of lack of maintenance by the Owner or is due to actions of others beyond the Contractor's control, repair or correction will not be required, unless authorized by the Owner as work additional to the original Contract. In this case, a written decision will be rendered by the Engineer.

1.27 RECORD DRAWINGS

- A. The Contractor shall comply with the provisions of Division 1, "General Requirements", with regard to maintaining and providing Record Drawings.
- B. In addition, any field changes to wiring diagrams, control sequences, or manufacturer's standard equipment shall be recorded in the published literature for that item and a copy placed with the apparatus in the field.

1.28 EQUIPMENT FURNISHED BY OTHERS

- A. The Electrical Contractor shall complete all connections required to operate equipment shown on the drawings as furnished by other Contractors or by the Owner. Connection shall include terminations, hardware, wire, wire nuts, flexible conduit where required, and disconnect switch (when shown).
- B. Testing of equipment furnished by others is not part of this Contractor's responsibility, but he shall provide manpower as necessary to verify that all electrical connections made by him are proper during tests.

END OF SECTION

**SECTION 26 0500
COMMON WORK RESULTS – ELECTRICAL**

PART 1 - GENERAL

1.1 EXECUTION OF THE WORK

- A. These specifications call out certain duties of the Electrical Contractor and his Subcontractors. They are not intended as a material list of items required by the Contract. Any reference in these specifications and on the accompanying drawings to the Contractor, Electrical Contractor, Electrical Subcontractor or abbreviation "E.C.", shall be construed to mean the Contractor responsible for all electrical construction (Division 26) work for this project.
- B. This division of the specifications covers the electrical systems of the project. It includes work performed by the electrical trades as well as trades not normally considered as electrical trades.
- C. Provide all items and work indicated on the Drawings and all items and work called for in this division of the specifications in accordance with the conditions of Contract (Division 01 General Requirements Documents). This includes all incidentals, equipment, appliances services, hoisting, scaffolding, supports, tools supervision, labor consumable items, fees licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to provide fully operable systems.
- D. Comply with all provisions of the Contract Documents including the General Conditions, and Division 01 General Requirements of the specifications.
- E. Certain terms such as "shall, provide, install, complete, start-up" are not used in some parts of these specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- F. Examine and compare the Electrical Drawings with these specifications, and report any discrepancies between them to the Architect/Engineer and obtain from him written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in said bid.
- G. Examine and compare the Electrical Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the Architect/Engineer and obtain from him written instructions for changes necessary in the work. At time of bid, the most stringent requirements must be included in said bid.
- H. Install and coordinate the electrical work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Architect/Engineer. All changes required in the work of the Contractor, caused by his neglect to do so, shall be made by him at his own expense.
- H. It is the intent of the Drawings and Specifications to provide a complete workable system ready for the Owner's operation. Any item not specifically shown on the Drawings or called for in the Specifications, but normally required to conform to the intent, are to be considered a part of the Contract.
- J. These specifications are basically equipment, installation, and performance Specifications. Some installation details are indicated on the Drawings. Where these differ from the Specifications, apply the more stringent at time of bid. Upon award of bid, contact Architect/Engineer for definite instructions.
- K. All materials furnished by the Contractor shall be new and unused (temporary lighting and power products are excluded) and free from defects. All materials used shall bear the Underwriter's Laboratory, Inc. label provided a standard has been established for the material in question.

- L. All products and materials shall be new, clean, free of defects and free of damage and corrosion.
- M. The exclusion from, or limitation in, the symbolism used on the Drawings or the language used in the Specifications for electrical work shall not be interpreted as a reason for omitting the accessories necessary to complete any required system or item of equipment.
- N. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.
- O. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material shall be the product of one manufacturer throughout. Multiple manufacturers will not be permitted.
- P. Receive, inspect, store, install and wire Owner-furnished equipment where Owner furnished equipment is supplied.
- Q. Painting
 - 1. All manufactured electrical equipment such as switchgear, panelboards, control equipment, lighting fixtures, etc., shall have factory-applied finish as specified in the appropriate article in the Electrical Parts of the Specification.
 - 2. All other uncoated steel items such as boxes supports, hanger, rods, etc., shall be galvanized or have a shop coat of paint applied under this Part of the Specification. Normally shop coats shall be an approved primer containing at least 50 percent rust inhibitive pigment, applied before assembling the different parts.
 - 3. Including painting and retouching of:
 - i. Pre-finished enclosures of panelboards, switches, wireways, etc., where the finish has been slightly damaged in transit before assembling the different parts.
 - ii. Any woodwork furnished in the electrical work.
 - iii. Fixture hangers, except those received from manufacturers that are prefinished.
 - iv. Miscellaneous iron brackets and supports.
 - v. Steel conduits buried in earth.
 - 4. Woodwork installed under this part of the specification shall be finished with filler sealer plus two (2) coats of PPG "Water Spar" gloss varnish.

1.2 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to ensure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. No items foreign to the electrical system shall be run in the dedicated space of the electrical equipment. Dedicated space shall be defined as the width and depth of the equipment from the floor to the bottom of the structural ceiling. Foreign systems include but are not limited to ductwork, piping, sprinklers, drip trays, etc. Contractor shall be responsible to coordinate the locations of the dedicated spaces with all trades as required.

- D. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- E. Wherever work interconnects with work of other trades, coordinate with other trades to ensure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- F. Due to the type of installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- G. The locations of lighting fixtures, outlets, panels and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in consequence of increase or reduction of the number of outlets, or in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- H. Exercise particular caution with reference to the location of panels, outlets, switches, etc., and have precise and definite locations approved by the Architect/Engineer before proceeding with the installation.
- I. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.
- J. Obtain from the Architect/Engineer in the field, the location of such outlets or equipment not definitively located on the Drawings.
- K. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of raceways to electrical distribution points. These tags show the circuits in each home run and the panel designation. Show the actual circuits numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, Electrical Contractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- L. The Drawings generally do not indicate the exact number wires in each conduit for the branch circuit wiring of fixtures, and outlets, or the actual circuiting. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control, wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the NEC.
- M. Adjust location of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway (and bus duct) prior to fabrication.
 - 1. 1. Right-of-Way:
 - a. Lines which pitch have the right-of-way over those which do not pitch. For example: steam, condensate, and plumbing drains normally have right-of way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - b. Make offsets, transitions and changes in direction in raceways (and bus duct) as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.
- N. Wherever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work shall be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.

- O. Contractor shall furnish services of an experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.
- P. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.
- Q. Where electrical connections are required, to equipment provided by the Owner or by other trades, this Contractor shall verify the exact requirements for these connections prior to ordering any materials or laying out any work. Where there is a discrepancy between the equipment being furnished and that shown on the Contract Drawings, the Contractor shall notify the Architect/Engineer for direction. Failure to comply with this coordination shall not constitute a reason for extra monies for equipment ordered or installed. Restocking charges will not be paid.

1.3 EXAMINATION OF SITE

- A. Prior to the submitting of bids, the Contractor shall visit the site of the job and shall familiarize himself with all conditions affecting the proposed installation and shall make provisions as to the cost thereof. Failure to comply with the intent of this paragraph will in no way relieve the contractor of performing all necessary work shown on the Drawings.

1.4 PROGRESS OF WORK

- 1. A. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Ship and store all products and materials in a manner which will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the Architect/Engineer.
- B. Delivery of Materials: Deliver materials in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessibly for inspection by the Architect/Engineer until installed. Store all items, susceptible to moisture damage, in dry, heated spaces.

1.6 EQUIPMENT ACCESSORIES

- A. Provide supports, hangers and auxiliary structural members required for support of the work according to Section 26 05 29 "Hangers and Supports for Electrical Systems."
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls or floors and elsewhere as will be required for the proper protection of each raceway (and bus duct) passing through building surfaces.
- C. Wall mounted equipment may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Glob-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.7 CUTTING, PATCHING

- A. The work shall be carefully laid out in advance. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlets or other equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork, metalwork, etc. shall be repaired by skilled mechanics or the trades involved at no additional cost to the Owner.
- B. The Contractor shall do no cutting, channeling, chasing or drilling of unfinished masonry, tile, etc., unless he first obtains permission from the Architect/Engineer. If permission is granted, the Contractor shall perform this work in a manner approved by the Architect/Engineer
- C. Where conduits, mounting channels, outlet, junction, or pull boxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.
- D. Slots, chases, openings and recesses through floors, walls, ceilings, and roofs will be provided by the various trades in their respective materials. The trade requiring them to properly locate such openings and be responsible for any cutting and patching caused by the neglect to do so.
- E. Structural steel fabricator and installer shall be responsible for the coordination of all framed openings in roof with approved equipment manufacturers. (Openings such as, but not limited to mechanical units, exhaust fans, curb mounted equipment, roof drains, skylights, stair openings, roof hatches, smoke hatches, duct thru roof penetrations, expansion joints, etc.)

Exact sizes and exact locations of all openings are to be verified with the approved shop drawings issued for the installation. The exact sizes shall be coordinated prior to any fabrication and installation by any/all trades. (Sizes and locations indicated on contract drawings are diagrammatic and for information only.)

Any fabrication and/or installation which have not been properly coordinated with approved equipment manufacturer and must be repaired, relocated, altered, replaced, re-installed or modified in any manner will be done to the satisfaction of the Owner with no additional cost to the Owner or design professional.

1.8 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire resistance of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping".

1.9 NORMAL VOLTAGES (Unless Otherwise Noted)

- A. Primary Distribution – above 120/208 volts.
- B. Secondary Distribution – 120/208 Volt, 3 phase, 4 wire.

1.10 MOUNTING HEIGHTS

- A. Unless otherwise noted or required because of special conditions the mounting heights of all equipment shall match that in the existing building, if those mounting heights comply with A.D.A.

1.11 DEMOLITION AND CONTINUANCE OF EXISTING SERVICES

- A. All existing electrical services not specifically indicated to be removed or altered shall remain as they presently exist.

- B. Should any existing services, etc., interfere with new construction, the Contractor shall (after obtaining written approval from the Architect/Engineer) alter or reroute such existing equipment to facilitate new construction.
- C. Shut down of existing services shall be coordinated with the Owner prior to altering any existing situation. The Contractor shall notify the Owner in writing giving two (2) weeks advance notice of planned alteration. The Electrical Contractor and Owner shall develop a sequence necessary to shutdown existing services and provide temporary power to those items which must remain active.
- D. It shall be solely the Contractor's responsibility to guarantee continuity of present facilities (with respect to damage or alteration due to new construction) and any unauthorized alteration to existing equipment shall be corrected by the Contractor to the Architect/Engineer's satisfaction at the Contractor's expense.

1.12 CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean, subject to the Architect/Engineer's instructions, which shall be promptly carried out.
- B. Contractor shall clean all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireways, trench ducts, cabinets, enclosures, etc. shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

1.13 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense, using workmen skilled in that trade.

1.14 SUPPORTS AND FASTENERS

- A. Provide supports, hangers and auxiliary structural members required for support of the work according to Section 26 05 29 "Hangers and Supports for Electrical Systems" and Section 26 05 48 "Vibration and Seismic Control for Electrical Components."
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls or floors and elsewhere as will be required for the proper protection of each raceway (and bus duct) passing through building surfaces.
- C. Wall mounted equipment may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Glob-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.15 PROHIBITED LABELS AND IDENTIFICATIONS

- A. Prohibited Markings: In all public areas, tenant areas and similar locations within the project, the inclusion or installation of any item, element or assembly which bears on any exposed surface any name, trademark, or other insignia which is intended to identify the manufacturer, the vendor, or other source(s) from which such object has been obtained, is prohibited. Also prohibited is the inclusion or installation of any article which bears visible evidence that an insignia, name, label, or other device had been removed.
- B. Exception: Required Underwriter's Laboratory labels shall not be removed nor shall identification specifically required under the various technical sections of the specifications be removed.

1.20 CONNECTION TO EXISTING UTILITIES AND SYSTEMS

- A. If connecting to an existing system, the Electrical Contractor shall be responsible to verify the integrity of the system being connected to. All applicable testing and acceptance will apply.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. If products and materials are specified or indicated on the Drawings for a specific item or system, use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of Shop Drawings where Shop Drawings are required or as approved in writing where Shop Drawings are not required.
- B. All equipment capacities, etc. are listed for job site operating conditions. All equipment sensitive to altitudes or ambient temperatures shall be derated and method of derating shown on Shop Drawings. Where operating conditions shown differ from the laboratory test conditions, the equipment shall be derated and the method of derating shown on Shop Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Follow manufacturer's instructions for installing, connecting, and adjusting all equipment. Provide one copy of such instructions to the Architect/Engineer before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Provide all special supports, connections, wiring, accessories, etc.
- B. Use mechanics skilled in their trade for all work.
- C. Keep all items protected before and after installation. Clean up all debris.
- D. Perform all tests required by local authorities in addition to tests specified herein, such as life safety systems.
- E. Applicable equipment and materials to be listed by Underwriters' Laboratories and Manufactured in accordance with ASME, NEMA, ANSI or IEEE standards, and as approved by local authorities having jurisdiction as mentioned in Division 1.
- F. Before commencing Work, examine all adjoining, underlying. Work on which this Work is in any way dependent for perfect workmanship and report any condition which prevents performance of first class work. Become thoroughly familiar with actual existing conditions to which connections must be made or which must be changed or altered.

3.2 PREMIUM TIME WORK

- A. The following Work shall be performed at night or weekend other than holiday weekends as directed and coordinated with the Owner.
 - 1. All tie-in, cut-over and modifications to the existing electrical system and other existing system requiring tie-ins or modifications shall be arranged and scheduled with the Owner to be done at a time as to maintain continuity of the service and not interfere with normal building operations.

3.3 PROJECT MANAGEMENT AND COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specification to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule
 - 2. Preparation of the Schedule of Values
 - 3. Installation and removal of temporary facilities and controls
 - 4. Delivery and processing of submittals
 - 5. Progress meetings
 - 6. Pre-installation conferences
 - 7. Project closeout activities
 - 8. Startup and adjustment of systems
 - 9. Project closeout activities
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into the work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

3.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequence.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Number of Copies: Submit three opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned. Markup and retain one returned copy as a Project Record Drawing.
 - b. Refer to individual Sections for Coordination Drawing requirements for work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

3.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the work.

3.6 PROJECT MEETINGS

- A. General: Attend meetings and conferences at Project Site, unless otherwise indicated.
- B. Preconstruction Conference: Attend a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement.

END OF SECTION

SECTION 26 0501
SUMMARY OF WORK - ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide the Work included in accordance with the Contract Documents.
- B. Provide all labor, materials, equipment, tools, appliances, auxiliaries, services, hoisting, scaffolding, support, supervision, and Project Record Documents, and perform all operations for the furnishing and installing of the complete electrical system, including but not limited to the work described hereinafter. The work shall meet or exceed the latest codes, regulations and requirements required by the local Building Department (as mentioned in Division 01).
- C. The electrical work is shown schematically on the Drawings to indicate the general system arrangement and configuration. The work of this Division shall include coordination with the work of other Divisions of the Specifications and the Contract Documents so as to provide a complete and operational system capable of being readily operated and maintained, including approved re-arrangement of the systems and equipment and re-routing of distribution services to enable the complete system to fit within the confines of the allotted electrical spaces, all to the satisfaction of the Architect/Engineer or as directed by the Architect/Engineer.
- D. The work shall include but not limited to the following:
 - 1. Panelboards
 - 2. Feeder and branch circuits
 - 3. Wiring devices
 - 4. Lighting fixtures
 - 5. Lighting controls
 - 6. Equipment connections
 - 7. Fire alarm system rework
 - 8. Intercom/clock system rework

1.2 SETTING OUT OF WORK

- A. All equipment capacities, etc. are listed for job site operating conditions. All equipment sensitive to altitudes or ambient temperatures shall be derated and method of derating shown on the Shop Drawings.
- B. Use mechanics skilled in their trade for all work.
- C. Keep all items protected before and after installation. Clean up all debris.
- D. Perform all tests required by local authorities in addition to tests specified herein, such as life safety systems.
- E. Applicable equipment and materials shall be listed by Underwriters' Laboratories and manufactured in accordance with ASME, NEMA, ANSI or IEEE standards and as approved by local authorities having jurisdiction.
- F. Before commencing work, examine all adjoining, underlying, etc., work on which this work is in any way dependent for perfect workmanship and report any condition which prevents performance of first class work. Become thoroughly familiar with actual existing conditions to which connections must be made or which must be changed or altered.

1.3 MECHANICAL EQUIPMENT WIRING

- A. Provide all labor and materials required to complete electrical (power) wiring for plumbing, heating and ventilating, elevators, escalators and miscellaneous equipment, as called for in these specifications and/or shown on the Drawings.
- B. Install and wire all single-phase motor protection switches and combination starters mounted within motor control centers, and disconnects as required for mechanical equipment unless otherwise specifically noted in these specifications or on the drawings. Remote starters will be provided by the trade providing the motor.
- C. Confirm final connections, loads, and locations of motors prior to ordering of equipment and installation.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
 - 2. PCB- and DEHP-containing lighting ballasts.
 - 3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or that are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Underground feeder and branch-circuit cable.
- B. Service entrance cable.
- C. Metal-clad cable.
- D. Wiring connectors.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- I. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.
- J. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- N. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Most Recent Edition, Including All Revisions.
- O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- Q. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- R. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

- S. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- T. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.
- U. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the installation of direct burial cable with other trades to avoid conflicts with piping or other potential conflicts.
 - 3. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Field Quality Control Test Reports.
- D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.

- B. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- C. Comply with NEMA WC 70.
- D. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- E. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- F. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 2. Control Circuits: 14 AWG.
- I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

2.03 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

- A. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.
- B. Provide equipment grounding conductor unless otherwise indicated.
- C. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Cable Jacket: Listed and labeled as sunlight resistant.

2.04 SERVICE ENTRANCE CABLE

- A. Service Entrance Cable for Above-Ground Use: NFPA 70, Type SE multiple-conductor cable listed and labeled as complying with UL 854, Style R.
- B. Conductor Stranding: Stranded.
- C. Insulation Voltage Rating: 600 V.

2.05 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
 - 1. Provide additional isolated/insulated grounding conductor where indicated or required.
- F. Armor: Steel, interlocked tape.

- G. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- C. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

2.07 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Wire Pulling Lubricant:
 - 1. Listed and labeled as complying with UL 267.
 - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 - 3. Suitable for use at installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
- L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 3. Wet Locations: Use heat shrink tubing.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
 - 1. Provide grounding electrode system for each separate building or structure.
 - 2. Provide equipment grounding conductor routed with supply conductors.

3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- D. Installer's qualification statement.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.

2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 2. Comply with MFMA-4.
 3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
 4. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2-inch diameter.
 - b. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 2. Powder-actuated fasteners are not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive support and attachment components.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- D. Conduit Support and Attachment: See Section 26 0533.13 for additional requirements.
- E. Secure fasteners in accordance with manufacturer's recommended torque settings.

3.03 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stainless steel rigid metal conduit (RMC).
- B. Galvanized steel intermediate metal conduit (IMC).
- C. Stainless steel intermediate metal conduit (IMC).
- D. Galvanized steel electrical metallic tubing (EMT).
- E. Stainless steel electrical metallic tubing (EMT).
- F. Conduit fittings.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- K. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- M. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- N. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel; Current Edition, Including All Revisions.
- O. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- P. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
- Q. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions and shop drawings.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- D. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.
- C. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Branch Circuits: 3/4-inch trade size.
 2. Control Circuits: 1/2-inch trade size.

- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
- B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
 2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
1. Manufacturers:
 - a. Substitutions: See Section 01 6000 - Product Requirements.
 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
 4. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 5. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.

2.07 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
1. Manufacturers:
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 4. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.

5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.
6. Embedded Within Concrete, Where Permitted: Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.08 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.
- B. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Connectors and Couplings: Use compression/gland or set-screw type.

2.09 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.
- E. Sealing Systems for Concrete Penetrations:
 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
 3. Product: _____.
 4. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive conduits.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Conduit Routing:
 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 2. When conduit destination is indicated without specific routing, determine exact routing required.
 3. Conceal conduits unless specifically indicated to be exposed.
 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 5. Unless otherwise approved, do not route exposed conduits:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.

6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 8. Arrange conduit to provide no more than the equivalent of three 90 degree bends between pull points.
 9. Arrange conduit to provide no more than 150 feet between pull points.
 10. Route conduits above water and drain piping where possible.
 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
- F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 0529.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 6. Secure joints and connections to provide mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 8400.
- I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where conduits are subject to earth movement by settlement or frost.
- J. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:

- a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- K. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

3.03 FIELD QUALITY CONTROL

- A. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
- D. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use nonmetallic boxes where exposed rigid PVC conduit is used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive boxes.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
 - 1. Unless dimensioned, box locations indicated are approximate.
 - 2. Locate boxes as required for devices installed under other sections or by others.
 - 3. Locate boxes so that wall plates do not span different building finishes.
 - 4. Locate boxes so that wall plates do not cross masonry joints.
- E. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- F. Install boxes plumb and level.
- G. Install boxes as required to preserve insulation integrity.
- H. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

- I. Close unused box openings.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Underground warning tape.
- E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

- b. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
- 2. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - a. Use only for indoor locations.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

2.04 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 - 1. Tape for Buried Power Lines: Black text on red background.
 - 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Interior Components: Legible from the point of access.
 - 4. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
 - 2. Determine connection locations and requirements.
- B. Sequencing:
 - 1. Install rough-in of electrical connections before installation of equipment is required.
 - 2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 2816.16 and in individual equipment sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.

- B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- E. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- F. NEMA PB 1 - Panelboards; 2011.
- G. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- L. UL 67 - Panelboards; Current Edition, Including All Revisions.
- M. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- N. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- O. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
- D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General Electric Company: www.geindustrial.com.
- B. Schneider Electric; Square D Products: www.schneider-electric.us.
- C. Siemens Industry, Inc: www.usa.siemens.com.
- D. Or approved equal.
- E. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
 - 3. Label equipment utilizing series ratings as required by NFPA 70.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Provide removable end walls for NEMA Type 1 enclosures.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
1. Phase and Neutral Bus Material: Aluminum.
 2. Ground Bus Material: Aluminum.
- D. Circuit Breakers:
1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
- E. Enclosures:
1. Provide surface-mounted enclosures unless otherwise indicated.
 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum.
 3. Ground Bus Material: Aluminum.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Provide compression lugs where indicated.
 - c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

2.06 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- B. Verify that mounting surfaces are ready to receive panelboards.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide grounding and bonding in accordance with Section 26 0526.
- J. Install all field-installed branch devices, components, and accessories.
- K. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

- L. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test AFCI circuit breakers to verify proper operation.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- F. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- G. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- H. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- I. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Certificates for Surge Protection Receptacles: Manufacturer's documentation of listing for compliance with UL 1449.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data:
 - 1. GFCI Receptacles: Include information on status indicators.
 - 2. Surge Protection Receptacles: Include information on status indicators.

- F. Project Record Documents: Record actual installed locations of wiring devices.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.03 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

2.05 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- C. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- D. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that final surface finishes are complete, including painting.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- G. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Field Quality Control Test Reports.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com.
- B. General Electric Company: www.geindustrial.com.
- C. Schneider Electric; Square D Products: www.schneider-electric.us.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. or approved equal.
- F. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet.
2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
- L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- B. Verify that mounting surfaces are ready to receive enclosed safety switches.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

- A. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 28 4600
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Transmitters for communication with supervising station.
- C. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

1.02 RELATED REQUIREMENTS

- A. Section 23 3300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 72 - National Fire Alarm and Signaling Code; 2016.
- C. NFPA 101 - Life Safety Code; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 - 12. Certification by Contractor that the system design complies with Contract Documents.
 - 13. Do not show existing components to be removed.
- C. Evidence of installer qualifications.
- D. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- E. Operating and Maintenance Data: See Section 01 7800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.

3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 4. List of recommended spare parts, tools, and instruments for testing.
 5. Replacement parts list with current prices, and source of supply.
 6. Detailed troubleshooting guide and large scale input/output matrix.
 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- F. Project Record Documents: See Section 01 7800 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- G. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.05 QUALITY ASSURANCE

- A. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to Owner upon completion.
- B. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- C. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

PART 2 PRODUCTS

2.01 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 2. Protected Premises: Entire building shown on drawings.
 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction.
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.

4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
 5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
 6. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
 7. Program notification zones and voice messages as directed by Owner.
 8. Fire Command Center: Location indicated on drawings.
 9. Fire Alarm Control Unit: New, located at fire command center.
- B. Circuits:
1. Initiating Device Circuits (IDC): Class B, Style A.
 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
 3. Notification Appliance Circuits (NAC): Class B, Style W.
- C. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
 2. Secondary: Storage batteries.
 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.02 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.
- B. Clearly label components that are "Not In Service."
- C. Remove unused existing components and materials from site and dispose of properly.

2.03 FIRE SAFETY SYSTEMS INTERFACES

- A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
1. Duct smoke detectors.
- B. HVAC:
1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.04 COMPONENTS

- A. General:
1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Initiating Devices:
1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
 2. Duct Smoke Detectors.
- D. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- E. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- F. Locks and Keys: Deliver keys to Owner.

- G. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 - 2. Provide one for each control unit where operations are to be performed.
 - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 - 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

END OF SECTION