



NORTHEAST SCHOOL CORPORATION

North Central High School
Kitchen Remodel
975 E CR 975 N
Farmersburg, IN 47850

PROJECT MANUAL

04/29/2022

Hannig Construction, Inc.
815 Swan Street
Terre Haute, IN 47807
812.235.6218 P
812.235.1218 F
hannigconstruction.com
hannigbidding.com



HANNIG
CONSTRUCTION INC

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C&T Design and Equipment Co.

Owner

Northeast School Corporation
620 N. Washington Street
Shelburn, IN 47879
812.383.5761 P
812.383.4591 F
nesc.k12.in.us

Construction Manager

Hannig Construction, Inc.
815 Swan Street
Terre Haute, IN 47807
812.235.6218 P
812.235.1218 F
hannigconstruction.com

Architect

Holder Design, Inc.
24 S. Fifth Street
Terre Haute, IN 47807
812.235.1300 P
holderdesign.net

MEP Engineer

R.E. Dimond
732 North Capitol Avenue
Indianapolis, IN 46204
317.634.4672 P
www.redimond.com

Food Service

C&T Design and Equipment Co.
2750 Tobey Drive
Indianapolis, IN 46219
317.644.7826 P
317.644.7866 F
c-tdesign.com

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TABLE OF CONTENTS

DIVISION 00 – BIDDING REQUIREMENTS, CONTRACTOR FORMS AND CONDITIONS

Section	000200	Notice to Bidders
	001000	Instructions to Bidders
	001010	Supplementary Instructions to Bidders
	001030	M/W/VBE Compliance
	003100	Bid Form
	004350	Subcontractors and Products List
	005000	Standard Form of Agreement, AIA A132-2019 with Exhibit A
	006216	Schedule of Insurance Coverage
	007000	General Conditions of the Contract for Construction, AIA A232-2019
	007300	Supplementary General Conditions

DIVISION 01 – GENERAL REQUIREMENTS

Section	011000	Summary
	011200	Multiple Contract Summary
	012100	Allowances
	012500	Substitution Procedures
	012600	Contract Modification Procedures
	012900	Payment Procedures
	013100	Project Management and Coordination
	013300	Submittal Procedures
	014000	Quality Requirements
	015000	Temporary Facilities and Controls
	016000	Product Requirements
	017300	Execution
	017329	Cutting and Patching
	017419	Construction Waste Management and Disposal
	017700	Closeout Procedures
	017823	Operation and Maintenance Data

DIVISION 2 THROUGH DIVISION 10 – NOT USED

DIVISION 11 - EQUIPMENT

Section	114000	Food Service Equipment
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DIVISION 12 THROUGH DIVISION 19 – NOT USED

DIVISION 20 – FIRE SUPPRESSION, PLUMBING & HVAC

Section	200010	Common Work Results for Fire Suppression, Plumbing and HVAC
	200050	Common Materials and Methods for Fire Suppression, Plumbing and HVAC
	200060	Common Pipe, Valves and Fittings for Fire Suppression, Plumbing and HVAC
	200180	Common Insulation for Plumbing and HVAC

DIVISION 21 – NOT USED

DIVISION 22 – PLUMBING

Section	221319	Waste Specialties
	224000	Plumbing Fixtures
	226315	Natural Gas Piping Specialties

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

Section	230593	Testing and Balancing
	233113	Metal Ducts
	233114	Exterior Pre-Insulated Ducts
	233300	Air Duct Accessories
	233713	Diffusers, Registers, Grilles & Louvers
	237413	Packaged Rooftop Units

DIVISION 24 – NOT USED

DIVISION 25 – NOT USED

DIVISION 26 - ELECTRICAL

Section	260500	Common Work Results for Electrical
	260519	Low-Voltage Electrical Power Conductors & Cables
	260526	Grounding & Bonding for Electrical Systems
	260529	Hangers & Supports for Electrical Systems
	260533	Raceways & Boxes for Electrical Systems
	260544	Sleeves & Sleeve Seals for Electrical Systems
	260553	Identification for Electrical Systems
	260923	Lighting Control Devices
	262416	Panelboards
	262726	Wiring Devices
	262813	Fuses
	262816	Enclosed Switches & Circuit Breakers
	262913	Enclosed Controllers
	265100	Interior Lighting

DIVISIONS 27 THROUGH 49 – NOT USED

END OF TABLE OF CONTENTS

NOTICE TO BIDDERS

Notice is hereby given that sealed bids will be received:

By: Northeast School Corporation

For: North Central High School Kitchen Remodel
910 E CR 975 N
Farmersburg, IN 47850

At: Northeast School Corporation Administration Office
620 N. Washington Street
Shelburn, IN 47879

Until: May 16, 2022 at 2:00pm EST

Bid Opening: Bids will be publicly opened and read aloud immediately following the time for receipt of bids. Bids received after this time will be returned unopened. Emailed or faxed bids will not be accepted.

BID CATEGORIES

Bids will be received for the following bid categories:

Bid Package No. 1 – General Trades
Bid Package No. 2 – Kitchen Equipment
Bid Package No. 3 – Plumbing & Mechanical
Bid Package No. 4 – Electrical

Drawings & Specifications may be obtained from the following locations:

- Hannig Construction, Inc. (Construction Manager as Adviser)
 - Website: www.hannigbidding.com (free download)
 - Office: 815 Swan Street, Terre Haute, IN 47807 (812) 235-6218 (for viewing Monday through Friday, 8:00am to 4:30pm)
- Big Picture Data Imaging, 700 S. Third St., Terre Haute, IN 47807 (812) 235-0202 (for purchase).

A voluntary pre-bid meeting will be held onsite at North Central High School Kitchen/Cafeteria on May 4, 2022, at 2:00pm EST. All bidders are encouraged to attend.

The Owner is a tax-exempt institution and Indiana State Sales Tax for products permanently incorporated in the Work shall not be included as part of the Bid or any Application for Payment. Responsive bidders may not have an active dispute, claim or litigation with the Owner.

All work for the complete construction of the Project will be under multiple contracts with the Owner based on bids received and combinations awarded. The Construction Manager as Advisor will manage the construction of the Project. Construction shall be in full accord with the Bidding Documents comprised of the Project Manual, Project Drawings and Addenda issued. The Owner will award the Contract to the lowest responsible and responsive bidder pursuant to the laws of the State of Indiana.

Northeast School Corporation is committed to diversity and non-discrimination in all aspects of its operations to ensure that certified MBEs, WBEs, and VBEs are included in all invitations for quotes and bids, and that all prospective

bidders are notified of Northeast School Corporation's expectation for diversity. Each Prime Contractor should actively solicit and include certified minority, women and veteran owned subcontractors in bid submissions if economically feasible. Reference Section 001030 M/W/VBE Compliance for additional information. All bidders must comply with State and Federal Non-Discrimination laws.

All proposals shall be made out and submitted on the Proposal Forms included in the Project Manual, including State Form 96. All proposals shall be firm without escalation clauses. Any bidder who contacts a Northeast School Corporation Employee/Board Member or who sends or distributes any promotional items or materials to same from the time bidding documents are available and bids are accepted until the time a Contract is awarded may be subject to rejection.

All Contractors must comply with Indiana Code Section 5-16-13 including provisions that all Contractors and Subcontractors must be pre-qualified with the Indiana Department of Administration, Public Works Division, Certification Board under I.C. 4-13.6-4 or under IC 8-23-10 prior to starting work on any local public works project over \$300,000.

All bids must be accompanied by a written plan for a program to test the Contractors' employees for drugs which complies with the requirements of Indiana Code 4-13-18. A Contractor whose bid does not include a written plan for an employee drug testing in compliance with the referenced code will not be considered.

Bid Security: Bidders shall include with their bid, a bid deposit in the amount of 5% of the total bid in the form of a bank draft, certified check, money order or bid bond (AIA A310). Bid bond shall be issued by a surety company authorized to do business in the State of Indiana. After an award has been made to the successful bidder(s), the bid securities will be returned within thirty (30) days. The bid security of the lowest acceptable, responsive bid will be returned upon request after the Northeast School Corporation has made an award to the successful bidder(s) and if satisfactory Payment and Performance Bonds have been delivered to the Northeast School Corporation. The successful bidder(s) will be required to furnish a satisfactory Payment and Performance Bond in the sum equal to the full amount of the Contract.

The construction hereby contemplated is to be governed at all times by applicable provisions of Indiana and Federal Law(s) including, but not limited to, the latest Amendments of the following: 1) Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596; 2) Part 1910 Occupational Safety and Health Standards, Chapter VIII of Title 29, Code of Federal Regulations; 3) Part 1926 Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations; 4) Indiana Code 5-16-13 as it pertains to Public Works Projects; 5) Indiana Code 22-3-5-1 and 22-3-7-34 for Workers Compensation; 6) Indiana Code 22-4-1 through 22-4-39-5 for Unemployment Compensation.

Northeast School Corporation reserves the right to reject any or all bids presented, waive any irregularities in bidding or technicalities as to procedures, and to award a contract on the bid that, in its judgment, is the most advantageous to the Northeast School Corporation. All bids may be held for a period not to exceed 60 days before awarding contracts.

Questions regarding the project can be directed to the Construction Manager:

Shawn Schaubert, Project Manager
Hannig Construction, Inc.
(812) 235-6218 Ph
(812) 235-1218 Fax
(812) 249-1044 Mobile
sschauber@hannigconstruction.com

NORTHEAST SCHOOL CORPORATION
By: Dr. Mark Baker, Superintendent

Advertisement Dates: 4/29/2022, 5/6/2022

END OF SECTION 000200

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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 |

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

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

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

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

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

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

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

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

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

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

§ 4.3 Submission of Bids

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

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

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

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

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

.5 Drawings

Number	Title	Date
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.6 Specifications

Section	Title	Date	Pages
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.7 Addenda:

Number	Date	Pages
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.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
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☐ 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 001010 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 STATEMENT OF INTENT

Unless otherwise provided in these Supplementary Instructions to Bidders, the preparation, submittal and consideration of proposals for the Work shall be bound and governed by the terms of AIA Document A701-2018, Instructions to Bidders, (2018 Edition – Electronic Format) included in this Project Manual following Section 001000. The following Supplementary Instructions to Bidders modify, delete from and add to the Instructions to Bidders. Where an Article, Paragraph, Subparagraph or Clause of the Instructions to Bidders is modified, deleted or added to by these Supplementary Instructions, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause shall remain in effect.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

A. ARTICLE 3 - BIDDING DOCUMENTS

1. Amend the Subparagraph 3.1.1 as follows:

Complete copies of the Bid Documents may be ordered by prospective Bidders from:

Big Picture Data Imaging
700 S. Third St.
Terre Haute, IN 47807
(812) 235-0202 (Phone)
bigpic@joink.com (General Email)

Store Hours: Monday through Thursday 8am – 5pm; Friday 7:30am-4pm
Closed Saturday and Sunday

Sets or partial sets may be purchased from printer by Prime Bidders or sub-bidders for the reproduction and delivery cost as determined by Big Picture, which is NOT refundable. Purchase of partial sets does not waive the Prime Bidders' responsibility to provide a complete bid.

2. Modify the following Clause 3.1.4:

Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner, Architect, nor Construction Manager assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3. Amend Subparagraph 3.2.2 as follows:

Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Construction Manager at least seven days prior to the date for receipt of Bids." The Construction Manager shall reasonably respond to such request. However, neither the Owner nor the Construction Manager shall have responsibility or liability for failure to respond. Requests shall be sent to:

Shawn Schaubert, Project Manager
Hannig Construction, Inc. (CM Adviser)
(812) 235-6218 Phone
(812) 235-1218 Fax
Email: sschauber@hannigconstruction.com

4. Amend Subparagraph 3.4.1 to read as follows:

Addenda will be transmitted by e-mail or fax to Bidders known by the issuing office to have received complete Bidding Documents.

B. ARTICLE 4 - BIDDING PROCEDURES

1. Amend Subparagraph 4.2.1 to read as follows:

Bidders shall include with their bid, a bid deposit in the amount of five percent (5%) of the total bid, including alternates, in the form of a bank draft, certified check, money order or bid bond. Bid bond shall be issued by a surety company authorized to do business in the State of Indiana. Every Bidder whose principal place of business is not in the State of Indiana shall file his or its bid security in the form of either a bid bond or a certified check drawn on a bank or trust company that is a member of the Federal Reserve System. After an award has been made to the successful bidder(s), the bid securities will be returned within thirty (30) days. The bid security of the lowest acceptable bidder will be returned on request after the Northeast School Corporation has made an award to the successful bidder and if satisfactory Payment and Performance Bonds have been delivered to the Northeast School Corporation.

2. Amend the last sentence of Subparagraph 4.2.4 as follows:

However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning sixty (60) days after the opening of Bids, withdraw its Bid and request the return of its bid security.

3. Modify the following Subparagraph 4.3.1:

A Bidder shall submit its Bid **in duplicate** on the date, time, and at the location identified in the Notice to Bidders.

4. Add the following Subparagraph 4.3.6:

Section 004350, Subcontractor and Material List shall be completed and submitted to the Construction Manager within twenty-four (24) hours of the Bid Date and time. Submit the completed listing to Shawn Schaubert (sschauber@hannigconstruction.com) or fax to 812-235-1218.

C. ARTICLE 5 - CONSIDERATION OF BIDS

1. Add the following new Subparagraph 5.2.1:

5.2.1 A bid by a Bidder who contacts a Northeast School Corporation Board Member, or who sends or distributes any promotional item or materials to a Northeast School Corporation Board Member from the time Bidding Documents are available and bids are accepted until the time a Contract is awarded may be subject to rejection.

2. Delete the first sentence of Subparagraph 5.3.1 in its entirety and add the following:

“5.3.1 The Owner will award the Contract to the lowest responsible and responsive proposal pursuant to the laws of the State of Indiana. Further award of the Contract shall be contingent upon submission of the proposal in accordance with the requirements of the Construction Documents and the limitation on funds available for the Project, although the Owner shall have the right to waive informalities or irregularities in a proposal received and to accept a proposal which is in compliance with the requirements of Indiana law. The Owner also has the right to reject all proposals.

3. Add the following Clauses after Subparagraph 5.3.2:

5.3.2.1 The Owner shall have the option, exercisable within sixty (60) calendar days after execution of the Contract, to accept any or all of the Alternate proposals for the sum or sums established for said Alternates in the Bid. Acceptance of such Alternate proposals after execution of the Contract shall not change the Contract Time for the Work as stated in the Contract, except as specifically noted in the Alternate proposal.

5.3.2.2 Alternate proposals not accepted by the Owner within the specified sixty (60) day period will automatically expire, unless extended in writing by the Contractor.

5.3.2.3 Alternate proposals accepted after execution of the Contract shall be incorporated into the Contract by Change Order.”

D. ARTICLE 6 – POST BID INFORMATION

1. Delete Paragraph 6.1 Contractor’s Qualification Statement.

E. ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

1. Delete Subparagraphs 7.1.1, 7.1.2, 7.1.3 and 7.1.4 in their entirety and replace with the following:

“7.1.1 Each bidder shall include in his proposal the cost of a Performance Bond and the cost of a Labor and Material Payment Bond. The Performance Bond shall be in the amount of 100% of the Contract Sum. The Labor and Material Payment Bond shall be in an amount of 100% of the Contract Sum. The bonds shall be executed by the bidder and by a surety company with A.M. Best rating of B+ or better, approved by the Owner and qualified to do business in the State of Indiana. Bonds shall be executed on AIA Form A312. Bonds shall be payable to: Northeast School Corporation.”

Add the following new Article 9:

F. “ARTICLE 9 - MISCELLANEOUS PROVISIONS

- 9.1 Governing Laws and Regulations

9.1.1 Codes and Standards:

1. International Building Code, latest edition, with Indiana Amendments, latest edition.
2. NFPA 101, latest edition."

PART 2 – Not Used

PART 3 – Not Used

END OF SECTION 001010

SECTION 001030 – MBE/WBE/VBE COMPLIANCE

PART 1 – GENERAL

1.01 MBE/WBE/VBE PARTICIPATION PLAN

- A. Northeast School Corporation is committed to diversity and non-discrimination in all aspects of its operations. This initiative is to ensure that certified MBEs, WBEs, and VBEs are included in all invitations for quotes and bids, and that all prospective bidders are notified of Northeast School Corporation's expectation for diversity. This expectation extends to all tiers of contractor utilization. Each Prime contractor should actively solicit and include certified minority, women, and veteran owned subcontractors in bid submissions if economically feasible.
- B. MBE, WBE, and VBE participation goals parallel those set by the Indiana Department of Administration for its own business diversity efforts. The State MBE/WBE/VBE participation goals may be found at <https://www.in.gov/idoa/mwbe/minority-and-womens-business-enterprises/participation-goals/>.
- C. The Owner, at its discretion, may waive in part or in whole the minority-owned business enterprise, women-owned business enterprise and/or veteran-owned business enterprise goal if in the opinion of the Owner it would be impractical, or not in the best interest of the Owner.

1.02 DEFINITIONS

- A. "Minority-owned Business Enterprise" (MBE) means an individual, partnership, corporation, limited liability company, or joint venture of any kind that is 51% owned and controlled by (1) or more persons who are (a) United States citizens; and (b) members of a racial minority group: African American, American Indians, Hispanics, Asian Americans, or other similar minority groups as defined by 13 CFR 124.103 and have been certified by the State of Indiana.
- B. "Women-owned Business Enterprise" (WBE) means an individual, partnership, corporation, limited liability company, or joint venture of any kind that is 51% owned and controlled by (1) or more persons who are (a) United States citizens; and (b) whose gender is female and have been certified by the State of Indiana.
- C. "Veteran-owned Business Enterprise" (VBE) means an Indiana firm with its principal place of business location in Indiana and is currently certified by the Department of Veterans Affairs as a veteran-owned business and have been certified by the State of Indiana or who have been Federally certified.

1.03 QUALIFICATIONS FOR PARTICIPATION

- A. In order to count toward participation goals, the MBEs and WBEs must be certified by the State of Indiana.
- B. VBEs must be certified by the State of Indiana or have been Federally certified.

1.04 PARTICIPATION LISTING

- A. Contractors shall list successful M/W/VBE bidders on the 004350 Subcontractor and Products List which is to be turned in to the Construction Manager within twenty-four (24) hours of the Bid date and time. Check the appropriate column on the Subcontractor and Products List indicating a company's certification. Proof of certification will be required.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 001030

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SECTION 001200 – SUBSTITUTION REQUEST FORM

To: Hannig Construction, Inc., Construction Manager
Attn: Shawn Schauber, sschauber@hannigconstruction.com

Project: North Central High School Kitchen Remodel

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	Paragraph	Specified Item

Proposed Substitution: _____

Attach complete technical data including laboratory tests, if applicable. Include complete information changes to Drawings and/or Specifications which proposed substitution requires for proper installation. Fill in the blanks below; use additional sheets, if necessary.

- A. Does the substitution affect dimensions shown on Drawings:
_____ Yes _____ No
- B. Will the undersigned pay for changes to building design, including engineering and detailing costs caused by substitution, if any?
_____ Yes _____ No
- C. What effect does the substitution have on other trades?

- D. Differences between proposed substitution and specified item?

- E. Manufacturer's guarantees of proposed and specified items are:

- _____ Same _____ Different (explain on attachment)

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted by:

Signature

Printed Name, Title

Company

Date

_____ Accepted _____ Accepted as Noted

_____ Not Accepted

**By: Shawn Schauber, Construction Manager
Hannig Construction, Inc.**

Signature

Date

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Complete and attach Contractor's Bid For Public Works Form 96

BY (CONTRACTOR):

Email

BASE BID(S):

BASE BID: _____ \$ _____
(amount in words) (amount in figures)

COMBINATION BID: Bidders bidding multiple bid packages as one combination bid shall first bid each package separately.

COMBINATION BID PACKAGE NUMBERS: _____

COMBINATION _____ \$ _____
BASE BID: (amount in words) (amount in figures)

This bid shall be valid for sixty (60) days.

ALTERNATE BID(S):

The undersigned also proposed to furnish or to omit all labor and material necessary to complete work as required by the "Alternate Bids" as provided in the Drawings and Specifications as follows:

ALTERNATE BID 01:

_____ Add or Deduct \$ _____

ALLOWANCES:

The following allowances have been included:

Allowance No. 1: General Contingency Allowance: Include the sum of \$10,000 as part of the Base Bid.

Allowance No. 2: Patching of Abandoned Penetrations: Include the sum of \$2,000 as part of the Base Bid.

ADDENDA:

The undersigned acknowledges receipt of the following Addenda and agrees that this proposal includes all items mentioned in such Addenda:

ADDENDA NOS. _____

ATTACHMENTS:

- Contractor's Bid for Public Works Form No. 96 (Revised 2013) completed and executed.
- Financial Statement as requested by Form 96.
- Non-Collusion Affidavit – Part of Form 96 – properly executed.
- Written Drug Testing Plan covering all employees of the bidder who will perform work on the project and meeting or exceeding the requirements set forth in IC 4-13-18-5 or IC 4-13-18-6 (provided by Contractor).
- Bid Security – a single bid bond is acceptable if the amount of the bond is for the maximum amount of any individual bid or combination bid to include any alternates.
- Bid envelope – separate bids and combination bids may be enclosed in a single envelope.
- Subcontractors and Products List to be submitted to the Construction Manager within 24 hours of the bid for two (2) apparent low bidders.

COMPLETION OF WORK:

The undersigned guarantees, if awarded the Contract, to complete the Work not later than the dates established in the Section 007300 Supplementary Conditions, Article 8.1.2 and 8.1.3.

BIDDER'S SIGNATURE:

IN TESTIMONY WHEREOF, the Bidder (an individual) has hereunto set their hands this _____ day of _____, 2022.

Individual Signature

Individual Printed Name

IN TESTIMONY WHEREOF, the Bidder (a firm) has hereunto set his hand this _____ day of _____, 2022.

Firm Name: _____

By: _____
Signature

Printed Name and Title

IN TESTIMONY WHEREOF, the Bidder (a Corporation) has caused this proposal to be signed by its President and Secretary and affixed its corporate seal this _____ day of _____, 2022.

Corporation Name: _____

President: _____
Signature Printed Name:

Secretary: _____
Signature Printed Name:

OATH AND AFFIRMATION:

I affirm under the penalties of perjury that the foregoing facts and information are true and correct to the best of my knowledge and belief.

Subscribed and sworn to before me by _____

This _____ day of _____, 2022.

Notary Public Signature

Notary Public Printed Name
Resident of _____

Commission Expiration: _____

BIDDER'S CERTIFICATION OF AUTHORIZED EMPLOYMENT

In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

The Prime Contractor shall require their Contractors who perform work under this Contract to certify to the Prime Contractor that the Contractor does not knowingly employ or contract with an unauthorized alien and that the Contractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a Contractor. The Prime Contractor and its Contractors at all levels must comply with all provisions of the statute or the Contract is subject to cancellation.

I hereby certify that I have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents and that the undersigned, the proposed and the actual sub-contractors at all tiers shall comply with the provisions of the Statute on behalf of and as authorized by the Bidder. I affirm and depose that the Bidder and our Contractors shall not knowingly employ unauthorized aliens.

(Bidder - Please print full name of your proprietorship, partnership, or corporation)

(Signature of Authorized Officer or Agent)

(Printed Name and Title of Authorized Officer or Agent)

(Date)

CERTIFICATION OF NON-INVESTMENT IN IRAN

The Undersigned certifies pursuant to Indiana Code 5-22-16.5, et seq., that it is not involved in the Iranian Energy Industry and does not do business with Vendors involved in the Iranian Energy Industry. The Undersigned understands that providing false certification may result in the consequences listed in IC 5-22-16.5-14, including termination of this Contract and denial of future contracts, as well as an imposition of a civil penalty.

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing are true and correct.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____
(Signature of Authorized Officer or Agent)

(Printed Name and Title of Authorized Officer or Agent)

ACKNOWLEDGEMENT

STATE OF _____)
)ss
COUNTY OF _____)

Before me, a Notary Public, personally appeared the above-named _____ and
swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

**CERTIFICATION REGARDING SUSPENSION, DEBARMENT,
INELIGIBILITY AND VOLUNTARY EXCLUSION**

This certificate is required by the regulations implementing Executive Orders 12549 and 12689, Uniform Guidance 2 CFR 200.213 and 2 CFR 180 sections regarding Suspension and Debarment.

Is your organization, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

Are any of your subcontractors, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

Your Company's Name:

Signature:

Printed Name/Title:

Date:



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)
Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of

_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS (If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

_____	_____
_____	_____
_____	_____

PART II

(For projects of \$11 0,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid.
Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV CONTRACTOR'S NON – COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
COUNTY OF _____) ss

Before me, a Notary Public, personally appeared the above-named _____ and swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

BID OF

(Contractor)

(Address)

FOR
PUBLIC WORKS PROJECTS
OF

Filed _____, _____

Action taken _____

SECTION 004350 - SUBCONTRACTORS AND PRODUCTS LIST

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The two (2) low responsive Bidders in each Bid Category shall furnish electronically, the following Subcontractors and Products List to the Construction Manager within one (1) working day (24 hrs.) of bid opening, unless submitted with Bid. The blanks appropriate to the Bid Category(ies) on which they bid shall be completed.
 - 1. The Owner, Architect/Engineer, and Construction Manager shall have the right to select any material or equipment named in the Specifications for any particular item where the Bidder either fails to list same or lists more than one name for the item in question.
 - 2. It is intended that this list will show the manufacturer and supplier of major items of work that will be subcontracted and to whom.

1.2 INSTRUCTIONS FOR SUBCONTRACTORS AND PRODUCTS LISTS

- A. Each Bidder shall submit a copy of their list of subcontractors and manufacturers of products and equipment proposed for work indicated as required above.
- B. The list shall be submitted on forms provided and shall be completely executed. "As Specified" or "With Equipment" type of terminology will not be accepted.
- C. Under "Subcontractor", insert the name of the firm which the Bidder proposes to have perform the respective work. If work will be done by the Bidder and no subcontract will be awarded, state "By Own Forces".
- D. Submission does not constitute acceptance for use of listed manufacturers' products. Materials and subcontractors are subject to the provisions of the General Conditions and "Standard of Product Acceptability" and must be formally reviewed and adjudged acceptable by the Construction Manager and Architect/Engineer.
- E. Construction Manager, Architect/Engineer, and Owner reserves the right to reject submissions of materials, work, or subcontractors that do not, in their opinion, meet the requirements of Drawings, Specifications or job conditions.
- F. Materials and subcontractors used for work on the Project shall be in accordance with accepted material list.
 - 1. The list is intended to assure use of materials and vendors acceptably equivalent to those specified and is not a substitution sheet or complete listing of required materials or services.
 - 2. Substitutions for listed items will not be allowed, except when termed acceptable, in writing by the Construction Manager and Architect/Engineer, provided that substitution will result in a cost savings to the Owner, determined by the Owner to be a better product, or is made necessary due to unavailability of listed item. Unavailability shall be confirmed in writing by manufacturer named on accepted list.

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NAME OF BIDDER _____

[illegible]

SECTION 004350 – PAGE 3
SUBCONTRACTORS AND PRODUCTS LIST

PART 2 – NOT USED
PART 3 – NOT USED
END OF SECTION 004350

PART 3 – NOT USED

END OF SECTION 004350

SECTION 005000 – STANDARD FORM OF AGREEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The Agreement shall be the “Standard Form of Agreement Between Owner and Contractor”, AIA Document A132-2019, a sample copy follows this section.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 005000

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AIA[®] Document A132[™] – 2019

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

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

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

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

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

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

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

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

This document is intended to be used in conjunction with AIA Documents A232[™]–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132[™]–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132[™]–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

AIA Document A232[™]–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

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

EXHIBIT A INSURANCE AND BONDS

EXHIBIT B DETERMINATION OF THE COST OF THE WORK

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

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

(Check one of the following boxes.)

- ☐ 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 of the Project or Portions Thereof

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

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

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

Portion of Work

Substantial Completion Date

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

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

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

☐ Not later than _____ (__) calendar days from the date of commencement of the Work.

☐ By the following date: _____

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

Portion of Work

Date to be substantially complete

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

ARTICLE 4 CONTRACT SUM

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

(Check the appropriate box.)

☐ Stipulated Sum, in accordance with Section 4.2 below

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

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

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

§ 4.2 Stipulated Sum

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

§ 4.2.2 Alternates

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

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

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

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

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

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

§ 4.2.4 Unit prices, if any:

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

Item	Units and Limitations	Price per Unit (\$0.00)
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§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price

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

§ 4.3.2 The Contractor's Fee:

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

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

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

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

§ 4.3.6 Unit prices, if any:

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

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

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

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

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

§ 4.4.2 The Contractor's Fee:

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

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

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

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

§ 4.4.6 Unit Prices, if any:

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

Item	Units and Limitations	Price per Unit (\$0.00)
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§ 4.4.7 Guaranteed Maximum Price

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

§ 4.4.7.2 Alternates

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

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

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

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

§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

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

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:
(Identify each assumption.)

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

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

§ 4.5 Liquidated damages, if any:

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

§ 4.6 Other:

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

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the ____ 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 Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ____ (__) days after the Construction Manager receives the Application for Payment.

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

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

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

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

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

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

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

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- .5 Retainage withheld pursuant to Section 5.1.7.

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

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

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

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

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

- .1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;
- .2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work included in Section 5.1.5.3.1.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

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

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

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

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

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

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

§ 5.1.6.2 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

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

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

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

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

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

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

- .1 That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;
- .2 That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .4 The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232-2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner’s auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

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

§ 5.1.6.6 In taking action on the Contractor’s Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner’s auditors acting in the sole interest of the Owner.

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

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

§ 5.1.7 Retainage

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

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

§ 5.1.7.1.1 The following items are not subject to retainage:

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

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

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

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

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

§ 5.2 Final Payment

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

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

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

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

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and
- .3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

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

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. *(Insert rate of interest agreed upon, if any.)*

_____ % _____

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

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

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

§ 6.2 Binding Dispute Resolution

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

(Check the appropriate box.)

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

☐ Litigation in a court of competent jurisdiction.

☐ 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 Where the Contract Sum is a Stipulated Sum

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

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

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

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

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

§ 7.2.1 Termination

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

§ 7.2.1.2 Termination by the Owner for Cause

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

- .1 Take the Cost of the Work incurred by the Contractor to the date of termination;
- .2 Add the Contractor’s Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor’s Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

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

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

§ 7.2.1.3 Termination by the Owner for Convenience

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

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

§ 7.3 Suspension

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

§ 8.2 The Owner’s representative:

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

§ 8.3 The Contractor’s representative:

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

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

§ 8.5 Insurance and Bonds

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

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

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

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

§ 8.7 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor’s Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor’s skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner’s interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

§ 8.8 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition
- .2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit
- .3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

- .5 Drawings

Number	Title	Date
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- .6 Specifications

Section	Title	Date	Pages
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- .7 Addenda, if any:

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

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

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

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

☐ The Sustainability Plan:

Title	Date	Pages
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☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents, if any, listed below:

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

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

OWNER (Signature)

CONTRACTOR (Signature)

(Printed name and title)

(Printed name and title)



AIA[®] Document A132[™] – 2019 Exhibit A

Insurance and Bonds

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

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

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

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

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

This document is intended to be used in conjunction with AIA Document A232[™]–2019, General Conditions of the Contract for Construction. Article 11 of A232[™]–2019 contains additional insurance provisions.

TABLE OF ARTICLES

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

ARTICLE A.1 GENERAL

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

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

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

§ A.2.2 Liability Insurance

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

§ 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, Construction Manager's, and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

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

Coverage

Sub-Limit

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

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

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

§ A.2.3.3 Insurance for Existing Structures

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

§ A.2.4 Optional Extended Property Insurance.

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

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

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

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

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

☐ § A.2.5.1 Cyber Security Insurance for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(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 Owner's Consultants, the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

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

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

§ A.3.2.2 Commercial General Liability

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

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

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

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

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

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

§ A.3.2.5 Workers' Compensation at statutory limits.

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

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

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

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

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

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

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

§ A.3.3 Contractor's Other Insurance Coverage

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

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

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

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

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

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

- ☐ § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than _____ (\$ __) per claim and _____ (\$ __) in the aggregate, for Work within fifty (50) feet of railroad property.
- ☐ § A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than _____ (\$ __) per claim and _____ (\$ __) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

- ☐ § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an “all-risks” completed value form.
- ☐ § A.3.3.2.5 Property insurance on an “all-risks” completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.
- ☐ § A.3.3.2.6 Other Insurance
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Limits

§ 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:

Reference Section 006216 - Schedule of Insurance Coverage

SECTION 006216 – SCHEDULE OF INSURANCE COVERAGE

PART 1 - GENERAL

1.01 INSURANCE REQUIREMENTS

- A. Reference the following Sections for additional information regarding insurance required for the project:
 - 1. Section 007000 - General Conditions of the Contract for Construction, AIA A232-2019 for additional insurance requirements.
 - 2. Section 007300 – Supplementary Conditions.
 - 3. Section 005000 – Standard Form of Agreement Between Owner and Contractor, A132-2019, Exhibit A.
- B. Additional document(s) included in this Project Manual following this section:
 - 1. Sample Certificate of Insurance

1.02 PROPERTY INSURANCE

- A. The Northeast School Corporation will provide Builder's Risk Insurance.

1.03 CONTRACTOR'S INSURANCE

- A. The following limits shall be incorporated into the Standard Form of Agreement Between Owner and Contractor, A132-2019, Exhibit A. All Contractors shall purchase and maintain the insurance coverages shown below, or greater as may be set forth in the contract documents/specifications, for the duration of the project and applicable statute of repose from insurance carriers with A.M. Best Ratings of 'A-' or better and who are licensed to do business in the State where the project is located.
- B. Workmen's Compensation & Employer's Liability - claims under applicable Workers Compensation and Occupational Disease and any other similar employee benefit acts with a minimum of:

Worker's Compensation: Statutory in the state the project is located
Employer's Liability: Bodily Injury by Accident \$1,000,000 each accident;
Employer's Liability: Bodily Injury by Disease \$1,000,000 each employee;
Employer's Liability: Bodily Injury by Disease \$1,000,000 policy limit
- C. Commercial General Liability, written on an occurrence basis and including coverage for:
 - Per Project Aggregate Limits
 - Premises and Operations
 - Employees as Insureds
 - Explosion Collapse & Underground
 - Broad Form Contractual, including Personal Injury
 - Products and Completed Operations for a period of two years after final payment
 - Independent Contractors
 - Limits

\$1,000,000 Each Occurrence
\$2,000,000 General Aggregate per project
\$2,000,000 Completed Operations Aggregate
\$1,000,000 Personal Injury
\$ 100,000 Fire Damage
\$ 5,000 Medical Payments

- D. Commercial Business Auto - including coverage for all owned, non-owned and hired autos.
Limits:

\$1,000,000 Combined Single Limit Bodily Injury & Property Damage
- E. Umbrella Liability and/or Excess Liability. Limit:

\$2,000,000 per Occurrence
\$2,000,000 Aggregate
- F. Contractor shall purchase such insurance as may be required for the protection of his own tools and construction equipment as he may desire and assumes liability for temporary tools and equipment of others. Contractor's material suppliers shall be responsible to purchase the same insurance as the Contractor if they will be onsite with their own vehicles and workers.
- G. Before permitting any lower tier subcontractors to perform any work on the project, Contractor shall require such lower tier subcontractors to maintain insurance in the same amounts and coverage.
- H. Neither the Owner nor Construction Manager's failure to require or insist upon Certificates of Insurance or other evidence of insurance nor either party's acceptance of a certificate or other evidence of insurance showing a variance from The Specified Coverage changes or waives the Contractor's obligation to comply with all provisions of Exhibit A and the project specifications.
- I. By submitting a Bid Proposal for the NORTH CENTRAL HIGH SCHOOL KITCHEN REMODEL PROJECT, Contractor is agreeing to all terms, conditions, and requirements of Hannig Construction, Inc. and the Owner's insurance requirements. No insurance requirement modifications will be made.
- J. The Contractor is required to keep a valid Certificate of Insurance on file for a period of three (3) years from the date of Substantial Completion.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 006216

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

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

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

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

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

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
X	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT LOC	X	X	XXXXXXXX	xx/xx/xxxx	xx/xx/xxxx	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$1,000,000 GENERAL AGGREGATE \$2,000,000 PRODUCTS - COMP/OP AGG \$2,000,000 FIRE DAMAGE \$ 100,000
X	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS	X	X	XXXXXXXX	xx/xx/xxxx	xx/xx/xxxx	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
X	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION \$	X	X	XXXXXXXX	xx/xx/xxxx	xx/xx/xxxx	EACH OCCURRENCE \$2,000,000 AGGREGATE \$2,000,000 \$
X	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE/OFFICER/MEMBER EXCLUDED? Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	X	X	XXXXXXXX	xx/xx/xxxx	xx/xx/xxxx	X WC STATUTORY LIMITS OTH-ER E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000

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

North Central High School, Farmersburg, IN, Kitchen Remodel Project. Northeast School Corp. (Owner), Hannig Construction, Inc. (CM) and the Owner's Consultants shall be included as additional insureds with respect to general liability (on a primary and non-contributory basis), automobile liability, and umbrella/excess liability as required by written contract. A waiver of subrogation in favor of the additional insureds is included for general liability, auto liability, workers compensation, and umbrella/excess liability as required per written contract. A 30-day written notice will be provided if any material change in insurance including company, limits, termination or cancellation, etc., occurs.

CERTIFICATE HOLDER

CANCELLATION

Northeast School Corporation
c/o Hannig Construction, Inc.
815 Swan St.
Terre Haute, IN 47807

Attn: Lisa Trusler, Office Manager
ltrusler@hannigconstruction.com

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

AUTHORIZED REPRESENTATIVE

Signature

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SECTION 007000 – GENERAL CONDITIONS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The General Conditions for this Project is AIA Document A232-2019, a copy of which is bound hereinafter.
- B. Refer to Section 007300, Supplementary Conditions, for modifications to the General Conditions.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 007000

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AIA[®] Document A232[™] – 2019

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

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

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

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

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

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

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

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT AND CONSTRUCTION MANAGER
- 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

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

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

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

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

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

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

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

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

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

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

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

§ 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 Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

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

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

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

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

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

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

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of

the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents:

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data, and Samples

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

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 Use of Site

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

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

§ 3.14 Cutting and Patching

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

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such

construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

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

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

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

§ 4.2 Administration of the Contract

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

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

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

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

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

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

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

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

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's

consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

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

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically

provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

§ 6.2 Mutual Responsibility

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

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

discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;

- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor

change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner’s own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor’s control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

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

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

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

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

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

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1)

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

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

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

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

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

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

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

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

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

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

§ 9.6 Progress Payments

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

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

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

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

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

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

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

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the

Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

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

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

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 **Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the

Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

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

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

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

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

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

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

§ 15.1.4 Continuing Contract Performance

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

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

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

§ 15.1.6 Claims for Additional Time

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

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

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SECTION 007300 - SUPPLEMENTARY CONDITIONS

1.01 SUMMARY

- A. The following supplements modify the “General Conditions of the Contract for Construction,” AIA Document A232, Electronic Format, 2019 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 - GENERAL PROVISIONS

1.1 Basic Definitions:

- 1.1.1 The Contract Documents: Amend Subparagraph 1.1.1 by deleting the last sentence, beginning with the words “Unless specifically enumerated...”

1.2 Correlation and Intent of the Contract Documents: Add the following Clause to Subparagraph 1.2.1:

- .1 In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with Architect's interpretation.

ARTICLE 2 - OWNER

2.3 Information and Services Required of the Owner: Delete Subparagraph 2.3.7 and substitute the following:

- 2.3.7 The Contractor will be provided with Electronic Documents only. All printing and reproduction cost shall be borne by the Contractor.

ARTICLE 3 – CONTRACTOR

3.2 Review of Contract Documents and Field Conditions by Contractor: Add the following Clause to Subparagraph 3.2.1:

- .1 In general, drawings are diagrammatic and schematic, and cannot indicate every offset, fitting, and accessory required for complete installation and to avoid all conflict with other trades. Contractor shall review drawings to verify spaces available and make reasonable modifications as approved by Architect and Owner, without extra costs to Owner. Maintain headroom and other space requirements in all areas; and where such requirements appear inadequate, notify Architect and obtain modifications from Architect approved by Owner before proceeding.

3.3 Supervision and Construction Procedures: Add the following Subparagraph:

- 3.3.4 The Contractor shall comply with the dimensions, figures and notations marked on the Drawings in preference to what the drawings may measure in scale; however, in the absence of figured dimensions, the Contractor shall contact the Architect for solution. Contractors shall not scale dimensions from the drawings unless expressly directed to do so by the Architect and Owner.

3.4 Labor and Materials:

Add the following Clauses to Subparagraph 3.4.2:

- .1 After the Contract has been executed, the Owner and Architect will consider formal requests for the substitution of products in place of those specified only under the conditions set forth in Division 1 Section – Products and Substitutions.
- .2 By making requests for substitutions based on Subparagraph 3.4.2, 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, but excludes costs under separate contracts, and excludes the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent.
 - .4 Will coordinate the installation of accepted substitute, making such changes as may be required for the work to be complete in all respects.

Add the following Subparagraph to Paragraph 3.4:

- 3.4.4 No materials manufactured or produced in a penal or correctional institution shall be supplied under this Contract.

- 3.6 Taxes: Amend Paragraph 3.6 by adding the words "Unless otherwise provided in the Contract Documents," to the beginning of the first sentence.

Add the following Subparagraphs to Paragraph 3.6:

- 3.6.1 Contractor shall include in its proposal the cost of any and all State and Federal taxes applying to the operation of performing Contractor's Contract.
- 3.6.2 The Contractor shall accept and assume the liability for timely compliance with the payment of all assessments and taxes under State and Federal Social Security laws, Unemployment Insurance, and other similar laws which otherwise might impose liability on the Owner in connection with the work described in Contract.
- 3.6.3 Gross Income Tax - Non-Resident Contractors for Projects Constructed in Indiana: The Owner is required by the laws of the State of Indiana to withhold 1.2% (1986 rate)* of all amounts to be paid to a non-resident Contractor in excess of \$1,000.00 per calendar year, and to pay the amount thus withheld directly to the Gross Income Tax Division. The term "non-resident contractor" does not include corporate contractors who are organized under the laws of states other than the State of Indiana; but who are duly licensed and qualified to engage in business within the State of Indiana, and who are so engaged in business within the State of Indiana. (* or current applicable rate as required by law)
- 3.6.4 For this Project which has a Tax-Exempt status, the Owner, upon request, shall provide the major Contractor(s) for the work a copy of, or signed statement identifying, each certificate of Tax Exemption to which the Owner is entitled. It shall then become the responsibility of the respective Contractor to notify its subcontractors and suppliers of the exemption from taxation of materials acquired for this Project, and to enforce full compliance by all Subcontractors and suppliers. Insofar as transactions between the Owner and Contractors/Suppliers are involved, this exemption status applies to all bidding in any division of the work, for materials/products furnished; for services performed and directly incorporated into construction of the Project.

3.7 Permits, Fees, Notices, and Compliance with Laws: Add the following to Subparagraph 3.7.1:

- .1 The Contractor shall pay all fees and obtain and pay for all permits required for completion of its Contract. Contractor shall obtain and pay for building permit and improvement location permit and deliver two copies of each permit to the Owner as soon as it is acquired. The permit should contain the declared valuation of the Project and note the cost of the permit.
- .2 Likewise, two copies of all legal notices, records of licenses acquired for the Project, and state or municipal authority certificates of inspection and occupancy, shall be delivered promptly to the Owner.
- .3 The fee associated with filing for a Construction Design Release by the Indiana Department of Fire and Building Services, Plan Review Division, or its equivalent of the state in which the Work is located will be paid by the Owner and is not a part of Contractor's Contract.

3.9 Superintendent: Add the following Clause to Subparagraph to 3.9.1:

- .1 Superintendent shall not be changed on the Project, without written notice of approval from the Owner and Construction Manager.

3.13 Use of Site: Add the following Subparagraph to Paragraph 3.13:

- 3.13.3 The Contractor shall make all repairs or pay for repairing of streets, sidewalks, alleys, and any other access ways, if/as they are affected by its performance under its contract.

3.18 Indemnification: Amend Subparagraph 3.18.1 by adding the words "and defend" after the words "hold harmless" in the first line. Delete the parenthetical phrase "(other than the work itself)" in the fifth line.

ARTICLE 4 - ARCHITECT

4.1 General: Delete Subparagraph 4.1.1 and substitute the following:

- 4.1.1 The Architect and its Professional Engineer are the persons or entities licensed to practice Architecture and to practice Engineering. They will be respectively identified as such in the Owner-Contractor Agreement and are referred to throughout the Contract Documents as singular in number and masculine in gender. The term "Architect" means the Architect or its authorized representative, and the term "Professional Engineer" means the Engineer or its authorized representative.
 - .1 Nothing contained in the Contract Documents shall create any contractual relationship between the Architect or its Professional Engineer, and the Contractor or any Subcontractors involved in a Contractor's Contract.

ARTICLE 5 - SUBCONTRACTORS

5.2 Award of Subcontracts and Other Contracts for Portions of the Work: Add the following Clause to Subparagraph to 5.2.1:

- .1 Not later than one (1) working day (24 hours) after submission of bid, the Contractor shall provide a list showing the names of the approved manufacturer proposed to be used for each of the products and the name of the installing Subcontractor on form prepared by Architect. Failure to object to a manufacturer shall not constitute a waiver of any of the requirements of the Contract Documents, and all products furnished by the listed manufacturer must conform to such requirements.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.2 Mutual Responsibility: Add the following Subparagraphs to Paragraph 6.2:

- 6.2.6 If work done by the separate Contractor is damaged by the Contractor or if work done by the Contractor is damaged by the separate Contractor and the Owner is sued by one or the other, the Owner shall defend such preceding at the Contractor's expense. If any judgment or award against the Owner arises therefrom, the Contractor shall pay or satisfy it. If no judgment or award arises against the Owner, the Contractor shall pay all attorney's fees and court or arbitration costs.
- 6.2.7 A Contractor shall not endanger the work of any other Contractors on the Project by cutting, excavating, or otherwise altering any work by others. Only written consent from the Architect and the Owner shall authorize cutting or altering by a Contractor of work done by another Contractor under a separate contract, involved with this Project.

ARTICLE 7 - CHANGES IN THE WORK

7.1 General: Add the following subparagraph to Paragraph 7.1:

- 7.1.4 The combined overhead and profit included in the total cost to the Owner of a change in the Work shall be based on the following schedule:
 - .1 For the Contractor, the Work performed by the Contractor's own forces, ten percent (10%) of the cost.
 - .2 For the Contractor, for Work performed by its subcontractor, five percent (5%) of the amount due the subcontractor.
 - .3 For each subcontractor of sub-subcontractor involved, for Work performed by its own force, five percent (5%) of the cost.
 - .4 For each subcontractor, for Work performed by its sub-subcontractors, five percent (5%) of the amount due the sub-subcontractor.
 - .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.6.
 - .6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their priority can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontractors performing portions of the Work. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall also be itemized. In no case will a change involving over \$500 be approved without such itemization.

7.2 Change Orders: Add the following Subparagraphs to Paragraph 7.2

- .4 Contractor's itemized estimate for charges or credits for additions to or deductions from work required by Contract shall always be available for inspection by both the Architect and Owner.
- .5 No percentage will be allowed for overhead or profit on such items as Insurance, Welfare Fund or Taxes.

7.3 Construction Change Directives: Revise Subparagraph 7.3.4 as follows:

- 7.3.4 In the fourth line of Subparagraph 7.3.4, delete the words "in the Agreement, or if no such amount is set forth in the Agreement," and substitute "in Subparagraph 7.1.4 above."

ARTICLE 8 – TIME

8.1.2 Revise Subparagraph 8.1.2 to read as follows:

8.1.2 The anticipated date of commencement of the work is: May 23, 2022

8.1.3 Revise Subparagraph 8.1.3 to read as follows:

8.1.3 The anticipated date of Substantial Completion is: August 1, 2022

8.3 Delays and Extensions of Time: Add the following Clause to Subparagraph 8.3.1:

- .1 If the progress of the Work is delayed relative to the Contractor's latest approved Construction Schedule without justification in accordance with subparagraph 8.3.1, the Contractor shall work such overtime necessary to comply with the Project Schedule.
Such overtime Work is to be executed without additional compensation.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.2 Schedule of Values: Add the following Subparagraph to Paragraph 9.2:

- 9.2.1 Schedule of values shall be submitted on AIA Document G702 and G703.

9.3 Applications for Payment: Add the following Clauses to Subparagraph to 9.3.1:

- .3 Until the Work is 50 percent complete, the Owner shall pay 90 percent of the amount due the Contractor on account of progress payments. At the time the Work is 50 percent complete and thereafter, the Construction Manager may authorize remaining partial payments to be paid in full upon approval by the Owner.
- .4 Each Application for Payment shall include the following documents:
 - .1 AIA Documents G702 and G703;
 - .2 Partial Waiver of Lien, required from the Contractor on the first Pay Request and each one thereafter until the last or final Pay Request which will then require a Full or Final Waiver of Lien;
 - .3 Partial Waiver of Lien from the Subcontractors and material suppliers on their previous payment. Final Pay Request will have Full or Final Waiver of Lien from the Subcontractors and material suppliers;
 - .4 Other such documents as may be required by the Owner.

9.6 Progress Payments: Add the following Subparagraphs to Paragraph 9.6:

- 9.6.15 Sums owed to the Owner by the Contractor may be deducted from payments otherwise due the Contractor pursuant to Article 9.

9.8 Substantial Completion

9.8.3 Add the following Clause to Subparagraph 9.8.3:

- .1 Except with the consent of the Owner, the Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall be

entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

9.8.5 Within Subparagraph 9.8.5, delete the second sentence and substitute the following:

Upon such acceptance and consent of surety, if any, the Owner may make payment sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect and/or the Owner shall determine for incomplete Work and unsettled claims.

9.10 Final Completion and Final Payment

9.10.1 Add the following Clause to Subparagraph 9.10.1:

- .1 Except with the consent of the Owner, the Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

Add the following Subparagraph to Paragraph 9.10:

- 9.10.6 Final payment shall be due within 61 days following the date of Substantial Completion. If at that time there are any remaining incomplete minor items, an amount equal to 200% of the value of each item as determined by the Architect shall be withheld until the incomplete item or items are completed. Final payment will include any retainage upon presentation to the Owner by the Contractor of AIA Document G707 and G704 (consent of surety and Substantial Completion).

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2 Safety of Persons and Property: Add the following sentence to the end of Clause 10.2.1.3:

Any such property, including areas used for temporary field offices, storage sheds and material storage and assembly, shall be restored to its original condition, unless otherwise specified, without cost to the Owner.

Add the following Clause to Subparagraph 10.2.7:

- .1 The structural framework or bearing walls of this Project are sized to support both the dead and the superimposed live load and be capable of supporting the people and the installations involved in the function thereof per area, but it is not calculated to provide for concentrations of unusual or eccentric stresses imposed by heavy construction or erection equipment or stacked concentrations of building materials placed thereon.
- .2 Any intent by the Contractor to so place heavy equipment or materials during stages of construction shall require him to engage a Registered Engineer and prepare calculations and drawings to be submitted to the Architect for approval and clearance before any such loads are imposed.
- .3 The relevant cost of the engineering, the preparation, the additional labor and materials required to protect and secure the original design against any impairment resulting from heavy concentration(s) of construction materials or equipment loads shall be included in the lump sum for construction of the Project.

ARTICLE 11 - INSURANCE AND BONDS

11.1 Contractor's Insurance and Bonds.

Add the following subparagraph to paragraph 11.1:

- 11.1.4 Reference Exhibit A, Insurance and Bonds, of AIA A132-2018, Standard Form of Agreement Between Owner and Contractor, for additional details regarding insurance required for the project. Reference Section 006216, Schedule of Insurance Coverage for limits and types of coverage required.

END OF SECTION 007300

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under separate contracts.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.
9. Qualifications

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

- A. Project Identification:** North Central High School Kitchen Remodel for
Northeast School Corporation
- Project Location:** 910 E CR 975 N
Farmersburg, IN 47850
- Owner:** Northeast School Corporation
620 N. Washington Street
Shelburn, IN 47879
- Owner's Representative:** Shawn Schaubert, Project Manager
Hannig Construction, Inc. (Construction Manager as Advisor)
815 Swan Street
Terre Haute, IN 47807
(812) 235-6218 Ph
(812) 235-1218 Fax
sschauber@hannigconstruction.com

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. The project will include the renovation of an existing 1,600 SF area located on the North Central High School Campus. The building will be renovated to facilitate the Kitchen and Cafeterias as indicated in the Contract Documents.
- B. Type of Contract:
 - 1. Project will be constructed under multiple prime contracts.

1.4 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.5 ACCESS TO SITE

- A. General: Each Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways, and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Use of these areas for parking or for storage of materials requires Owner approval.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during regular school hours during the construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise approved by the authorities having jurisdiction.

1.7 WORK RESTRICTIONS

- A. On-Site Work Hours: All work will be performed during normal work hours of 7:00am to 3:30 pm Monday-Friday, excluding holidays.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

1.9 QUALIFICATION CRITERIA

- A. Prospective Bidders must demonstrate the following to the satisfaction of Owner if requested:
 - 1. Proper license under the laws and regulations governing their respective trade(s).
 - 2. Capacity to provide Performance Bond, Labor and Material Payment Bond, and Insurance in a form acceptable to Owner in amounts adequate to bond the Work.
 - 3. Applicable experience of firm as described in the Contractor's Qualification Statement, including the following:
 - a. Experience of Firm: The firm in its current organization shall have successfully completed minimum of five projects of similar type, quality, and scope, including a minimum of two within the last five years. The firm shall have a record of project completion, credit record, record of judgment claims, arbitration proceedings, and suits pending or outstanding acceptable to Owner.

- b. Experience of Firm Officers: The firm officers shall have personal record of project completion acceptable to Owner.
 - c. Experience of Project and Field Management Staff to Be Committed by the Prospective Bidder to Carry Out the Work: The assigned project manager and field superintendent must have successfully completed minimum of three projects of similar type, quality, and scope.
 - d. For purposes of this submittal, reference to "key individuals" as described in the Contractor's Qualification Statement shall be understood to mean the principal in charge, the project manager(s), and the project field superintendent(s) committed by the Prospective Bidder to carry out the Work of this Project. Prospective Bidder by submitting qualifications of key individuals agrees that Owner reserves the right to approve or reject subsequent reassignment of key individuals.
 - e. For purposes of this submittal, "successful completion" shall be understood to mean completion of project within project schedule and budget. Provide additional information indicating reasons why any referenced project did not meet project schedule or project budget.
 - f. For purposes of this Qualification, "similar project" shall be understood to include the following project elements:
 - 1) Renovation/addition work on occupied sites.
- 4. Adequate financial resources, including ability to secure materials and labor necessary for completion of the Work and other work in hand, within the anticipated contract times, and reflecting the anticipated retainage from progress payments.
 - 5. Work-in-hand capacity, such that the Prospective Bidder demonstrates adequate work under contract to continue its business operations at least at their current level, at the same time indicating the capability to carry out Owner's proposed work.
 - 6. Adequate organization to complete work of the scope anticipated, including firm management, project management, field superintendence, and field engineering and quality control.
 - 7. Acceptable past performance as indicated by firm's references, including ability to meet contract time and to monitor, manage, and communicate interim scheduling requirements, to carry out required quality-control activities, to properly prepare interim and final payment requests, and to successfully complete project closeout requirements.
 - 8. Acceptable documentation of firm's employee screening practices as indicating by affidavit describing background check procedures for firm's employees and requirements for same incorporated in firm's subcontracts.
- B. Consideration of qualifications may be withheld if the Qualification Statement shows any unexplained erasures, omissions, alterations of form, additions not called for, added restrictions or qualifying conditions, or other irregularities of any kind.
 - C. Owner may make such investigations as it deems necessary to determine the ability of the Prospective Bidder to perform the Work, and the Prospective Bidder shall furnish to Owner all such information for this purpose as Owner may request. Owner reserves the right to withhold qualification if the evidence submitted by or investigation of such Prospective Bidder fails to satisfy Owner that such Prospective Bidder is properly qualified to carry out the obligations of the proposed Project. The determination of which bidders are qualified is not protestable, except as allowed by law.

- D. Qualification Submittal and data contained therein is considered privileged and confidential and will not be disclosed to any outside party except as required by law.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 011200 - MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. The narrative description to follow is provided to assist the bidder in determining the various trade contracts/bid packages involved in the project. The term 'Contractor' and 'Prime Contractor' are used interchangeably throughout this document and have the same meaning.
- D. Individual Bid Package Scopes of Work follow.
- E. List of Bid Packages for this Project:
 - Bid Package No. 1: General Trades
 - Bid Package No. 2: Kitchen Equipment
 - Bid Package No. 3: Plumbing and Mechanical
 - Bid Package No. 4: Electrical

PART 2 – Not Used

PART 3 – EXECUTION

Bid Package No. 1: General Trades: Provide labor, materials and equipment for all work as detailed on the A series drawings to include but not limited to the following:

- Demolition, owner will have first right to salvage.
- Dumpsters and temporary toilets.
- Infill of existing opening with like construction. Masonry infills should be toothed in.
- Provide new openings in existing masonry as needed. These new openings should be toothed in.
- Wood blocking as need in new walls.
- New wall construction.
- New doors and hardware.
- Acoustic Ceilings (new and rework of existing to accommodate new construction).
- Penetrations and flashing for roof top units.
- Painting of walls and ceilings.
- Epoxy flooring/base and rework of existing VCT to accommodate new construction.
- Review other bid packages for item required by this bid package.
- Cutting and patching of concrete slab as for work of others as detailed on the drawings. Excavation, backfill and compaction will be by the contractor that is installing the required service under slab.

Bid Package No. 2: Kitchen Equipment: Provide labor, materials and equipment necessary for the installation of a complete kitchen equipment package to include but not limited to the following:

- Furnish, delivery to the building, uncrating, setting in place and leveling for all specified food service equipment.
- Coordinate with mechanical and electrical contractor for connections to equipment. Utility connections will be made by plumbing, mechanical and electrical contractors.
- Provide sealants for equipment that is being set as a part of this contract.
- Provide cardboard protection of stainless-steel items to remain in place until final cleaning takes place.
- Furnish and install the kitchen hood and all closure panels. Electrical connections by electrician.
- Provide hood fire protection system to meet all applicable codes.
- Provide field start-up of all equipment furnished and installed in this bid package.
- Provide owner training session for the kitchen staff on all new equipment.
- Equipment items that are to be reused are to be set in place by this contractor. Connections to be made by others.
- Provide and install all roof curbs for items provide under this scope of work. Penetrations and roof flashing by General Trades.
- Any necessary hoisting to the roof of items provided by this bid package is included.

Bid Package No. 3: Plumbing and Mechanical: Provide labor, materials and equipment necessary for the complete installation of plumbing and mechanical work as detailed on the drawings to include but not limited to the following:

- Provide all demolition, new plumbing and connections related to the kitchen renovation, including all underground and tunnel work. New equipment and reused/reinstalled equipment is included for final connections.
- Provide gas connection to rooftop HVAC unit and kitchen HVAC unit.
- Provide grease interceptor.
- Provide demolition, new mechanical and connections related to the kitchen renovation.
- Provide new DX/gas-fired rooftop unit and all related ductwork and controls.
- Any necessary hoisting to the roof of items provided by this bid package is included.

Bid Package No. 4: Electrical: Provide labor, materials and equipment necessary for the complete installation of electrical work as detailed on the drawings to include but not limited to the following:

- All electrical equipment indicated herein and is indicated on the drawings to make kitchen remodel electrically complete.
- Provide interior lighting and controls.
- Provide wiring devices.
- Provide electrical distribution., including panels and feeders.
- Provide branch circuit wiring.
- Provide connections and controls for kitchen equipment and HVAC equipment. This is to include new equipment and reused/reinstalled equipment.
- Provide overcurrent protection.
- Provide grounding and bonding.
- Provide temporary power and lighting if needed.
- Any necessary hoisting to the roof of items provided by this bid package is included.

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Contingency allowances.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower- priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: General Contingency Allowance: Include the sum of \$10,000 as part of the Base Bid.
- B. Allowance No. 2: Patching of Abandoned Penetrations: Include the sum of \$2,000 as part of the Base Bid.

END OF SECTION 012100

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. A Substitution Request Form follows this section for use in submitting substitution information.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Division 01 Section "Alternates" for products selected under an alternate.
 - 2. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 3. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

- b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

**NORTH CENTRAL HIGH SCHOOL
KITCHEN REMODEL**

SUBSTITUTION REQUEST FORM

To: Hannig Construction, Inc., Construction Manager
Attn: Shawn Schauber, sschauber@hannigconstruction.com

Project: North Central High School Kitchen Remodel

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	Paragraph	Specified Item

Proposed Substitution: _____

Attach complete technical data including laboratory tests, if applicable. Include complete information changes to Drawings and/or Specifications which proposed substitution requires for proper installation. Fill in the blanks below; use additional sheets, if necessary.

- A. Does the substitution affect dimensions shown on Drawings:
_____ Yes _____ No
- B. Will the undersigned pay for changes to building design, including engineering and detailing costs caused by substitution, if any?
_____ Yes _____ No
- C. What effect does the substitution have on other trades?

- D. Differences between proposed substitution and specified item?

- E. Manufacturer's guarantees of proposed and specified items are:

- _____ Same _____ Different (explain on attachment)

The undersigned states that the function, appearance, and quality are equivalent or superior to the specified item.

Submitted by:

Signature

Printed Name, Title

Company

Date

_____ **Accepted** _____ **Accepted as Noted**

_____ **Not Accepted**

**By: Shawn Schauber, Construction Manager
Hannig Construction, Inc.**

Signature

Date

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 5 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect of the proposed change in the work will have on the contract time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in section "Product Substitution" if the proposed change requires substitution of one product or system for a product or system specified.
 5. When requested, prepare explanations and documentation to substantiate the margins claimed.
 6. Include a statement indicating the effect the proposed change in the work will have on the contract time.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests, forms provided by Owner. Sample copies are included at end of this Section.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
 - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices, if any.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to the Architect at earliest possible date but no later than seven (7) days after award of contract.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Name of Construction Manager.
 - e. Contractor's name and address.
 - f. Date of submittal.
 2. Submit draft of AIA Document G703 Continuation Sheets.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Change Orders (numbers) that affect value.
 - d. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Provide a break down by materials and labor for each line item.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Construction Manager by the third week of each month during the duration of the project.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. List of Contractor's staff assignments.
 6. List of Contractor's principal consultants.
 7. Copies of building permits.
 8. Certificates of insurance and insurance policies.
 9. Performance and payment bonds.
 10. Data needed to acquire Owner's insurance.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 2. Updated final statement, accounting for final changes to the Contract Sum.
 3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 5. AIA Document G707, "Consent of Surety to Final Payment."
 6. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications 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.
 5. 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.
 6. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- B. 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. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- C. 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.

1.5 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 sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to 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.

- 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.

1.6 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.
 - 1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. 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: Schedule a preconstruction conference before starting construction. 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, 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:
 - 3. Minutes: Record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation 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 of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. 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: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, 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) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) 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. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of Owner, 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 the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

- C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."
- D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 3. Division 01 Section "Quality Requirements" for submitting test and inspection reports.
 - 4. Division 01 Section "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's/Consultant's responsive action.
- B. Informational Submittals: Written information that does not require Architect's/Consultant's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. All submittals are to be sent electronically to the Construction Manager for further processing. For submittals providing physical samples, a photograph of each physical sample being submitted shall accompany the electronic copy of the submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Construction Manager/Consultants reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence upon the reviewing party's receipt of the submittal.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow 15 days for review of each resubmittal.
 3. Concurrent Consultant Review: When a submittal requires concurrent review by the Construction Manager, Owner, Owner's Consultants, or other parties, allow 21 days for review of each submittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately on label or beside title block to record Contractor's review and approval markings and action taken by Construction Manager/Architect/Consultants.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Construction Manager.
 - e. Name and address of Contractor.
 - f. Name and address of subcontractor.
 - g. Name and address of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Construction Manager will return submittals, without review, received from sources other than Contractor.
 1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.

- c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number, numbered consecutively.
 - k. Remarks.
 - l. Signature of transmitter.
 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Consultants on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with the approval notation by the Construction Manager.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.

- g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Number of Copies: Submit the number of copies of each submittal required for distribution to appropriate parties. Construction Manager will each retain one copy plus one copy for Owner's files, if required, and return remaining copies. Mark-up and retain one returned copy as a project record document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.

- c. Sample source.
 - d. Number and title of appropriate Specification Section.
- 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Construction Manager will return submittal with options selected.
- 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - b. Number of Samples: Submit two sets of Samples. Construction Manager/Owner will retain one. Mark up and retain returned Sample set as a Project Record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- 6. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - a. Type of product. Include unique identifier for each product.
 - b. Number and name of room or space.
 - c. Location within room or space.
- 7. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

- E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on

evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- K. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.

- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Safety Data Sheets (SDSs): Submit information directly to Construction Manager.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 CONSTRUCTION MANAGER'S / CONSULTANTS' ACTIONS:

- A. General: Construction Manager/Consultants will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Construction Manager/Consultants will review each submittal, make marks to indicate corrections or modifications required, and return it. Construction Manager/Consultants will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Construction Manager/Consultants will review each submittal and will not return it or will return it if it does not comply with requirements. Construction Manager will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

- C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: 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 uncertainties and requirements that are different, but apparently equal, to Architect 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 Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor with copy to Architect.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric power service use charges for electricity used by all entities for construction operations.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails. Secure the construction area as required.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system, private system indicated as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead or underground, unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 - 2. At each telephone, post a list of important telephone numbers.

- a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
 2. Remove upon completion and restore areas effected to previous conditions.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction.

Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 01 Section "References" for applicable industry standards for products specified.
 - 2. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

- D. Manufacturer's Warranty" Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- E. Special Warranty: Written warranty required by or incorporated into the contract documents, either to extend time limit provided by manufacturer's warranty or to provide more rights to the Owner.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 - 4. Completed List: Within 45 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - 5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.

- b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
5. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
 9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
 10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

- a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
- b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.
 10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

2.4 BASIS OF DESIGN PRODUCTS

- A. Where a substitute is proposed for a specified product or manufacturer or a manufacturer changes published information that was the original "Basis-of-Design", results in additional construction costs and/or redesign costs, if any, will be borne by the Contractor.

PART 3 – NOT USED

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. General installation of products.
 - 2. Coordination of Owner-installed products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Remove and replace components that do not operate properly.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 02 Section "Selective Structure Demolition" for demolition of selected portions of the building.
 - 2. Divisions 2 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 3. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Air or smoke barriers.
 - 3. Fire-suppression systems.
 - 4. Mechanical systems piping and ducts.
 - 5. Control systems.
 - 6. Communication systems.
 - 7. Conveying systems.
 - 8. Electrical wiring systems.
 - 9. Operating systems of special construction in Division 13 Sections.

- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond- core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even- plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DISPOSAL OF WASTE

- A. General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

- 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.

- B. Related Sections include the following:

- 1. Division 01 Section "Execution" for progress cleaning of Project site.
 - 2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

- 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 7. Complete startup testing of systems.
 - 8. Submit test/adjust/balance records.
 - 9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 10. Advise Owner of changeover in heat and other utilities.

11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Prepare and submit project record documents, operation and maintenance manuals and similar final record information.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive **8-1/2-by-11-inch (215-by-280-mm)** paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

- a. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - b. Remove snow and ice to provide safe access to building.
 - c. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
 - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - e. Sweep concrete floors broom clean in unoccupied spaces.
 - f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - h. Remove labels that are not permanent.
 - i. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - k. Replace parts subject to unusual operating conditions.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, finishes and systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.

4. Date of submittal.
 5. Name, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold **8-1/2-by-11-inch (215-by-280-mm)** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on **8-1/2-by-11-inch (215-by-280-mm)** white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite

manual, so that resulting bookmarks reflect the system, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.

10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."

- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 114000 - FOODSERVICE EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Related work specified elsewhere:

1. Instruction to Bidders
2. Mechanical Division
3. Electrical Division

B. Food Service Equipment Contractor or abbreviation FSEC means the Person, Company, or Corporation, which will contract for the work specified.

1. N.I.F.S.E.C. - Not In Food Service Equipment Contract. Items that are denoted as N.I.F.S.E.C. in these specifications section are not provided by the FSEC.

C. Work by Mechanical Contractor

1. Roughing-in all required mechanical services as shown on drawings provided by FSEC after bidding.
2. Furnish and install all piping, traps, tailpieces, loop vents, stops, and related items necessary to make the final connections from the rough-in to the connection points on the equipment.
3. Furnish and install all drain line and waste piping and components. Drain piping to be hard copper.
4. Install the following items, which are furnished by FSEC: faucets, disposers, vacuum breakers, solenoid valves, check valves and related items.
5. Provide and install condensate drain lines on walk-in cooler/freezer (item # 1). Drain lines to be secured to the cooler-freezer with 1" standoffs. Drain lines piping to be hard copper.
6. Install floor troughs provided by FSEC.
7. Work required by any notes on the Food Service Equipment drawings
8. Make all final connections from point of rough-ins shown on the plans and specifications to the connection points on the equipment.

D. Work by Electrical Contractor

1. Roughing-in all required electrical services as shown on drawings provided by FSEC after bidding.
2. All final connections from point of rough-in shown on the plans and specifications to the connection points on the equipment.
3. Furnish and install all disconnects, conduit, wire, flexible conduit, cover plates, fittings as required to make the final connections from the junction box to the equipment.
4. All inter-wiring of fire system to fuel shutoffs. Provide fuel shutoffs and shunt trip breakers where required.
5. All inter-wiring of walk-in cooler/freezer, including installation of light fixtures furnished loose by

the FSEC. Includes providing and installing the control wiring between the remote refrigeration units located on the roof and the evaporator coils located in the walk-in cooler and freezer. E.C. to extend power to the freezer evaporator coil from the remote refrigeration unit located on the roof.

6. Provide control wiring from fan on roof and on/off wall switch or dishmachine control panel for condensate exhaust system on/off control in dishroom.
7. Interwiring between disposer and disposer control panel

E. Work by General Contractor

1. Drill or cut openings through walls, floors for ductwork and refrigeration lines. Provide sleeves were shown or required.
2. Furnish recessed floor pits and install floor insulation for walk-in coolers or freezers where required. Pits to be smooth and transit leveled.
3. Provide roof penetrations and setting and flashing of roof curbs for kitchen exhaust system fans/furnaces and remote refrigeration systems when required.
4. Provide and install rail style roof curbs and pipe curbs for mounting of remote refrigeration systems on roof.
5. Provide and install back bracing in walls where required.
6. Provide concrete curbs and bases for equipment when required.
7. Box out concrete floor opening to size as shown on drawings

F. Work by the Food Service Equipment Contractor

1. The furnishing, delivery to the building, uncrating, setting in place, leveling, and scribing to the walls, or floor, as required, all Food Service Equipment covered herein.
2. The furnishing of all electrical service fixtures directly attached to the equipment, as called for herein or shown on the drawings.
3. When work covered by this specification connects to equipment furnished by others, FSEC shall check the equipment in the field and be held responsible for the proper connections to such equipment. When an item is called out in the specifications as "existing", "future" or "by owner", the FSEC shall verify the make, model number and size of the equipment and make provisions on the rough-in drawing for these items.

G. Preparation of Bid

1. FSEC is to submit itemized list of equipment in duplicate, listing manufacturer's name and model number with separate price shown for each item. Owner reserves the right to delete any item of equipment from list.
2. Where any discrepancies between the specifications and drawings are found the FSEC to provide the greater.

1.02 Quality Assurance

- A. All equipment installed under these specifications shall be manufactured and installed in strict compliance with all codes, regulations and requirements of the Michigan Department of Health

and Human Services, all local Health and Sanitation Authorities, and the National Sanitation (NSF) Standard #2.

- B. All electric equipment shall conform to the standards of the NEMA and shall be UL approved, where applicable standards have been set, or otherwise conform to the jurisdictional authorities.
- C. All equipment installed shall be of latest design. Any improvements made in design or construction of prefabricated items after this contract has been awarded and before equipment is actually delivered to site, shall be incorporated in the equipment, provided such incorporation does not effect date of delivery of equipment.
- D. Fabricated equipment, described in the following itemized specifications, is required to be manufactured by one equipment manufacturer, who has the facilities to detail and fabricate highest quality of equipment in strict compliance with appropriate standards of NSF.
Accepted fabricators are as follows: Conover Custom Fabrication, Indianapolis, IN.

1.03 Submittals

- A. The FSEC shall prepare and furnish to the Architect eight (8) sets of detailed drawings and brochures as follows:
 - 1. Equipment Fabricator shop drawings prepared on a 3/4" = 1'-0" scale.
 - 2. All necessary cross-section drawings - scale at 1-1/2" = 1'-0".
 - 3. Roughing-in drawings - scale 1/4" = 1'-0".
 - 4. Properly bound and identified brochures on all buy-out equipment.
 - 5. Drawing of walk-in cooler/freezer systems including panels, refrigeration details, and proposed piping requirements.
 - 6. Shop drawings of all custom equipment.All the above drawings and brochures to be submitted at the same time. The above shall be delivered to the Architect within 30 days following signing of the contract. Changes or corrections shall be noted and returned to the FSEC. FSEC shall revise drawings and brochures, if necessary, and return eight (8) complete sets to the Architect for distribution to other trades involved with the kitchen area. FSEC shall be solely responsible for any errors and omissions on approved drawings.
- B. The FSEC shall furnish to the other contractors doing work in the kitchen area, proper instructions regarding rough-in drawings and shall ascertain that all items furnished by others are properly set and installed during the progress of the work.
- C. Drawings showing a detail of duct locations, and locations of any special wall opening or floor detail are also required and shall be submitted as part of roughing-in drawings.
- D. Submit maintenance and operating instructions to the Architect for approval. Confirm format (electronic or hard copy) and quantity with Architect.

1.04 Product Delivery, Storage, and Handling

- A. The FSEC is responsible for all deliveries and for the unloading and storing of all equipment to be installed under this contract. Equipment shall not be shipped to the project unless the FSEC is at the job site and has the necessary manpower and unloading equipment to properly handle each item of equipment.
- B. All equipment shall be received at the building fully protected. It will be the responsibility of the FSEC to protect equipment until accepted by the Architect or Owner.

1.05 Job Conditions

- A. The FSEC shall be responsible for checking the building conditions for access into the building and to the Kitchen area. If it is necessary to have hoisting equipment, or to remove any door, doorframe, wall, or window, FSEC shall assume the cost of this work.

1.06 Specifications

- A. NOTE: All equipment to be bid as specified. If Bidder desires to substitute another manufacturer in lieu of item specified, they must request approval within ten (10) days prior to the bid date. Requests need to be submitted to Architect complete with information of manufacturer's name, model number, etc. If approved, Architect will issue addendum to all Bidders of record.

1.07 Guarantee

- A. The FSEC shall execute and deliver to the OWNER a "Letter of Guarantee" covering all workmanship and materials for a period of one (1) year from the date of acceptance by the Architect, or first day's use by Owner, whichever comes first.
- B. FSEC shall warrant to repair or replace any defective part or material at his own expense, upon notice from Architect or Owner in this one-year period.
- C. All compressors shall have an additional four (4) year part warranty.

PART 2 - PRODUCTS

2.01 Materials

- A. STAINLESS STEEL
 - 1. U.S. Standard gauges specified.
 - 2. Type 302 or Type 304, composition:
 - 18% minimum chromium
 - 8% minimum nickel
 - 2/10th% maximum carbon
 - 3. Mill finish 180 grit one side with not less than 100 grit other side.
 - 4. Sheets shall bear manufacturer's trademark designating type and heat number.
 - 5. All sheets stretcher leveled.
 - 6. Hard ground finish not acceptable.
- B. GALVANIZED IRON
 - 1. Approved grade low carbon steel or copper bearing steel.
 - 2. Commercial quality.

2.02 Fabrication and Manufacture

- A. Leg Assemblies
 - 1. Legs 1-5/8" O.D., stainless steel.
 - 2. Cross-rails 1-1/4", stainless steel.
 - 3. Cross-rails welded to legs ground and polished to a smooth fillet.
 - 4. Feet to be stainless steel, adjustable, bullet shape with 1-1/2" adjustable minimum.

5. Feet to have vermin-proof closed bottoms and unexposed threads.
6. Legs attached to tops with stainless steel gussets welded to tabletop.
7. Legs to be removable, held by set screws to gussets.
8. Leg spacing not more than 5'-0" O.C., connected with cross braces unless otherwise noted.
- B. Doors
 1. To be insulated double pan stainless steel construction with recessed handles.
 2. Attach to enclosed mullions with stainless steel piano hinges.
 3. All screws to be stainless steel
 4. All cabinets to be sealed to the wall with Dow Corning # 732 Clear sealant.
- C. Table Tops
 1. 14-gauge stainless steel
 2. All seams and corners welded.
 3. Heights to be adjustable from 34" to 35" unless otherwise noted.
 4. All reinforced with 4" x 1" 14-gauge "c" channel underbracing, galvanized standard in all prep areas and 16-gauge stainless steel standard in all dishrooms and water related areas.
 5. Any studs to have chrome plated acorn nuts.
 6. Cross members at each pair of legs, length and width.
 7. Two angles welded lengthwise on the underside of tops up to 30" wide. Angles spaced maximum 24" O.C. on tops over 30" in width.
 8. Undercoated with approved sound-deadening material.
 9. Unless against wall and/or other equipment otherwise noted, to turn down 1-1/2" at 90 degree and back 3/4" at 45 degree.
 10. Where tops are against walls and/or other equipment, provide 8" high backsplash with 2-1/2" return at 45° and down 1/2". All horizontal and vertical corners to be 3/4" cove. End of splashes welded closed.
- D. Stainless-Steel Counters
 1. Tops to be 14-gauge stainless steel, unless against wall and/or other equipment otherwise noted, to turn down 1-1/2" at 90 degree and back 3/4" at 45°
 2. End and backsplash to turn up 4" with 1" return to wall and down 1/2".
 3. Attach to wall with "Z" clips.
 4. Top to be sound deadened.
- E. Cabinet Body
 1. To be constructed of 16-gauge stainless steel.
 2. All front corner and door mullions to have enclosed double wall construction with no raw edges.
 3. All intermediate and bottom shelves to be 18-gauge stainless steel and to turn up 2" at rear and ends with coved corners.
- F. Base
 1. To be of 14-gauge stainless steel and shall be welded to counter body.
 2. Front base to be recessed 2" behind front of counter body.
- G. Dishtables
 1. 16-gauge stainless steel tops with s/s underbracing.
 2. Backsplash 10" high with 2-1/2" return @ 45° and down 1/2".
 3. Edges not adjacent to walls and/or other equipment to have 3" high 1-1/2" 180° rolled rim, corners bull nosed.
 4. Tops slope to dishwasher, sink, trough, cone and/or quick drain.
 5. At dishwashers turn down per manufacturers recommendation, bolt and seal.
 6. Pass-thru's shall be integral with top and backsplash.

7. Side splash/splash shield to be integral with top and backsplash
8. Quick drains to be 4" wide x 3" deep integral with top with removable perforated splash cover, and 1" chrome plated brass drain.
9. Undercoated with approved sound-deadening material.
10. All horizontal and vertical corners to be ¾" cove, end of splashes welded closed.

H. Drawers

1. Bodies 18-gauge stainless steel.
2. Face 16-gauge stainless steel welded to drawer liner frame.
3. Drawer slides to be sloped, mounted on angle frame with nylon roller bearings.
4. Pan slide assemblies to be removable.
5. Size 20" x 20" x 5".

I. Sinks

1. 16-gauge stainless steel welded integral with top.
2. Corners to have ¾" cove welded, smoothed and polished on interior and exterior.
3. Multiple sinks to have 1" divider partitions between compartments and one piece s/s front apron.
4. Scrap sinks to have "H" style removable rack guides.
5. All sinks to have lever handle waste except where disposer is specified. All pot and pan sinks to have lever waste with rear connected overflow.
6. Faucet to be T & S Brass and Bronze with removable seats.
7. All sink sections shall be mounted on legs, complete with cross braces at front and ends.

J. Drainboards

1. 16-gauge stainless steel welded integral to sinks.
2. Rims and backsplash to match sinks coved ¾".
3. Slope to sink.
4. Two (2) legs, with cross braces between legs, are required for support when drainboard length does not exceed 54". A minimum of four (4) legs are required for drainboards over 54".

K. Undershelves

1. 18-gauge stainless steel welded to each leg or removable type as specified.
2. Supported by connecting rails or notched and welded to each leg.

L. Overshelves

1. 12" wide or less 16-gauge stainless steel.
2. Wider than 12", 14-gauge stainless steel.
3. Ends and front turn down 1-1/2" at 90° and under 1/2" at 45°.
4. When adjacent to wall or fixtures turn up 1-1/2" with a minimum of 3/4" cove.
5. All corners welded, ground and polished.
6. Supporting brackets to be 16-gauge stainless steel cantilever type.
7. When specified as table mounted, support with 1-1/4" stainless steel tubing going thru fer-ruled openings in tabletop or backsplash and braced below tabletop.

M. Wall Shelves

1. 16-gauge stainless steel.
2. When adjacent to wall or fixtures turn up 1-1/2".
3. All corners welded, ground and polished.
4. Supporting brackets to be 16-gauge stainless steel cantilever type.

N. Disposer Troughs

1. 14-gauge stainless steel.
2. Slope to disposer approximately ¼" per foot.

3. Provide water inlet, plumbed to disposer solenoid by mechanical division.
 4. Provide removable stainless steel silver saver in trough.
 5. Disposer to mount so legs are a minimum of 4" from front of table.
- O. Grinding, Polishing and Finishing
1. All joints, including field joints, unless otherwise specified, shall be welded and suitably ground flush with adjoining material and neatly finished to harmonize with same. Wherever materials have been depressed or sunken in by the welding operation, such depressions shall be hammered and peened flush with the adjoining surfaces, and again ground to eliminate low spots. All ground surfaces shall be polished or buffed to match adjoining surfaces, consistent with good workmanship. Care shall be exercised in all grinding operations to avoid excessive heating of the metal and metal discoloration.
 2. The texture of the final polishing operation shall be uniform and smooth. The general finish of all metal shall be of a high grade. Wherever sheared edges occur, they shall be free of burrs and projections to eliminate all danger of cutting and laceration when the hand is drawn over sheared edges. Where miters or bullnosed corners occur, they shall be neatly finished with the under edge of the material neatly ground to a uniform condition and in no case shall overlapping of materials be acceptable. It is the intention of the specifications to cover equipment of a high quality finish consistent with the highest grade of manufacturing practice in the industry.

PART 3 - EXECUTION

3.01 Inspection

- A. It is the responsibility of the FSEC to continually be aware of the progress of the entire project and especially that part of the project affecting his work
- B. Before any floor is poured, it is the responsibility of the FSEC to check all roughing-in, wall openings, floor depressions, and to notify the Architect and the Sub-Contractor involved, in writing, of any errors, and/or omissions. The FSEC shall not be held responsible for any omissions of roughing-in if said roughing-in was on the drawings used by the mechanical and electrical contractors. FSEC will be responsible for any and all omissions required on the project, but not shown on his drawings.

3.02 Preparation

- A. The FSEC shall be required to take all field measurements and be responsible for their own errors or omissions. FSEC is responsible for coordinating the location of chases and passageways of supply lines in the equipment with the location of the corresponding lines in the building.

3.03 Field Quality Control

- A. The FSEC shall provide a representative on the premises during the installation of the equipment and shall supervise the installation of the equipment and connections.

3.04 Adjust and Clean

- A. At the completion of this work, and continuously during the progress of the work, the contractor shall remove all rubbish and accumulated trash as a result of his work. He shall leave the premises clean, orderly and in an acceptable condition.
- B. All equipment resting against walls, floor, and/or ceilings shall be sealed to same with mastic sealer such as Dow-Corning Clear #781 building sealant.

All equipment resting on masonry bases shall be sealed to such structures with above sealant and shall be constructed to overhang same to provide toe space.

Metal framework and/or housing are to be turned under with sufficient distances to overlap base to eliminate openings at this point.

- C. Before final inspection, the FSEC shall remove all protection covering from the equipment and give all items of equipment a thorough cleaning and servicing, leaving all equipment free of defects, clean, and ready for operation. At final inspection all equipment shall be installed and in place per these plans and specifications. All floors shall be swept clean. FSEC contractor is responsible during the progress of the work, until final acceptance of the work by Architect, for protection against fire, theft, and damage to his equipment by any cause.

3.05 DEMONSTRATIONS AND INSTRUCTIONS TO OWNER

Upon completion of this contract, the FSEC shall perform, at a time determined by the Architect, demonstrations of all items of the Food Service Equipment provided under this contract. The FSEC shall explain the function, performance, and general application of the equipment.

3.07 EQUIPMENT SCHEDULE

ITEM 1 - HOT WATER DISPENSER (1 REQ'D)

Hatco Model AWD-12

Atmospheric Hot Water Dispenser, countertop design, 12-gallon capacity, automatic fill, pushbutton portion control, low water cut-off, electronic temp. control with digital display, stainless steel tank & base. 208/60/1, 5.0kw. NEMA 6-30P

1 ea. Model: AWD-FILTER Water filtration system with 10' of 1/4" tubing & fittings

KEC to mount water filter on island table chase. PC to make all plumbing connections as required.

ITEM 2 - MICROWAVE STEAMER OVEN (1 Existing to be Reused)

Panasonic Model NE-3280

208v/60/1-ph

EC to verify utilities with existing equipment.

ITEM 3 - CUSTOM WORKTABLE (1 REQ'D)

Conover Custom Fabrication

Worktable to be size and shape as shown on drawings 14-gauge stainless steel top, sound deadened with square edges on front and sides and stainless-steel legs with adjustable hex feet. Back splash to be 8" high. Provide (1) 20" x 20" x 5" drawer with vinyl insert as shown. Provide open base with 16-gauge undershelf as shown on drawings. Provide 6" minimum clearance below shelf. Shelf to be fully welded

and all stainless-steel construction. FSEC to coordinate opening in table and undershelf for drain line for item 15 Groen Steamer.

ITEM 4 - SPARE NO.

ITEM 5 - SPARE NO.

**ITEM 6 - BUN / SHEET PAN RACK (1 REQ'D)
Lakeside Manufacturing Model 125**

Sheet Pan/Tray Rack, narrow opening, full height, open sides, capacity (35) 18" x 26" pans or (70) half size pans, channel ledge, 1-7/16" spacing, (4) 4" casters, welded stainless steel construction

Accessories to Include:

- 1 ea. Corner leg bumpers
- 1 ea. Pan stop
- 1 ea. Casters, 4" swivel, corner stem, standard

ITEM 7 - ENCLOSED BUN PAN RACK – EXISTING (1 REQ'D) – Existing to be relocated

ITEM 8 - UTILITY CART - EXISTING (1 REQ'D) – Existing to be relocated

ITEM 9 - SPARE NO.

**ITEM 10 - CUSTOM ISLAND WORKTABLE WITH OVERSHELF AND SINK (1 REQ'D)
Conover Custom Fabrication Model CUSTOM**

Worktable to be size and shape as shown on drawings. 14-gauge stainless steel top, sound deadened with square edges on front and sides and stainless-steel legs with adjustable hex feet. Provide (3) 20" x 20" x 5" drawers with vinyl inserts as shown. Provide open base with 16-gauge undershelf as shown on drawings. Provide 6" minimum clearance below shelf. Shelf to be fully welded and all stainless-steel construction. Provide 4"x16" utility chase with removable panel. Chase to extend to 6" above finished ceiling. Provide trim ring. Provide 16-gauge overshelf as shown. Overshelf surface to be 19" above table surface. Provide 3 pre-wired receptacles as shown. Provide sink 10" deep and sized as shown.

Accessories to Include:

- 1 each **T&S Brass Model B-0133-12ACBJST** pre-rinse faucet
- 1 each **T&S Brass Model B-3952** lever waste

EC to connect to junction boxes on table as required. PC to make all water and drain connections as required.

**ITEM 11 - HEATED CABINET (Existing to be relocated) (1 REQ'D)
Vulcan Model VP18-1M3ZN.**

120/60/1, 16.7 Amps.

EC to confirm utilities with existing equipment and Provide Receptacle

**ITEM 12 - KITCHEN EXHAUST SYSTEM (1 REQ'D)
Allied Air Model CH SERIES**

HOOD: Avtec exhaust only (13'-8" Long x 4'-6" Wide x 30" Tall) with ceiling mounted stainless steel supply air plenum (12" Wide), full-length of hood, complete with balancing dampers and s/s perforated diffusers in bottom panel. Hood to include Type 300 Series stainless steel construction where exposed; (5) recess mounted, vapor proof LED light fixtures (12" diameter) prewired to "J" box on top of hood; flush mounted Deluxe control panel w/ fan switch, light switch, indicator lights, "Summer Off/Winter" switch, temp dial & remote reset; 3" rear standoff; stainless steel baffle filters-20" tall; removable grease trough and cup; exhaust collars installed (VERIFY location) and hanging brackets. Listed to meet NSF and UL 710 standards and constructed to meet NFPA-96. Type 300 Series stainless steel wall panels from floor to bottom of hood and matching s/s trim panels from top of hoods to ceiling.

INCLUDED. Avtec CH Series

1. Hood shall be equipped with Temp Sensors and exhaust fan interlock per international Mechanical Code.
2. All Control Wiring from Fire Suppression Micro-Switch to exhaust hood terminal block to be completed in field by EC/Building Alarm Contractor

EXHAUST FAN: Belt driven, top discharge exhaust and UL 762 Listing. Fan includes disconnect switch, grease trough, curb hinges, and insulated roof curb for flat membrane roof (VERIFY Pitch). JENcoFan STXBRHUL-20 , 3,780 CFM each @ 1.00" s.p., 1.5 HP, 208v/60hz/3ph, 6.30 Amps, Weight: 233 lbs.
Roof Cutout Required: 24" x 24" as shown on drawings.

TEMPERED SUPPLY UNIT: Direct fired gas supply unit, ETL Listed, with washable filters, painted housing, motorized inlet damper, master electrical control center with disconnects and fused motor starters for the supply and exhaust fan motors, Maxitrol 14 electronic modulation control system, temperature selector control, 50'-0" of color-coded and labeled wiring harness, low-temp limit switch and electric spark pilot ignition. To include insulated roof curb & support rail for flat membrane roof (VERIFY Pitch). Air Systems V2, 3,024 CFM @ 2.00" total s.p., 2 HP, 208v/60hz/3ph, 7.50 Amps, Weight: 385 lbs.

NOTES:

1. Approx. Minimum 40 Amp Circuit Required for Supply and Exhaust Fan Motors, Motorized Inlet Damper, Electronic Ignition and Controls.
2. 241,315 BTU/Hr
3. Verify gas type
4. Roof Cutout Required: 24" x 24"

INSTALLATION: Deliver and hang hood complete w/ wall panels, trim panels & supply plenum; provide and install all welded, 16 gauge black iron exhaust ductwork, horizontal runs sloped from fan to hood, complete with cleanout access panels and 2 layers of fire wrap insulation as required by the International Mechanical Code; provide & install 22 gauge galvanized steel make-up air ductwork per

SMACNA low pressure standards; locate & cut roof openings (Metal deck ONLY), spot curbs/support rail and set fans/furnace. To include Indiana State Submittals and Local Permits as required.

TEST & BALANCE: Start-up, test and balance system, and perform capture & containment tests, complete with documentation if required.

General Notes:

1. Not Included by FSEC: Service platforms, railings, structural work, ceiling work, electrical or plumbing work. Control wiring, fire protection chases if required, framing openings, flashing curbs, and sealing or trimming of openings
2. The deficit supply air, 830 CFM, must be provided by the building HVAC system for proper operation.

Work by Other Trades:

ROOFING CONTRACTOR: Set-in-place and flash all roof curbs and support rail (furnished and located by hood system supplier). Trim roof deck openings.

STRUCTURAL CONTRACTOR: Provide framing for roof curb openings as required. Provide any framed openings in floors or walls that may be required for ductwork routing.

ELECTRICAL CONTRACTOR: Provide power to rooftop kitchen MUA unit and connect to master control panel (voltage and phase as shown on contract drawings). Provide and install wiring in sealtite conduit from MUA unit master control panel to exhaust fan disconnect switch. Furnish conduit and run factory supplied control wiring harness from MUA unit master control panel color coded terminal block to color coded terminal strip located in junction box on top of designated exhaust hood. Provide and install (1) 120/60/1, 20-amp circuit to junction box on top of designated hood for hood lights. Complete final connections of temp sensors and hood lights from provided and pre-wired j-box on one hood to the provided and pre-wired j-box on the other hood to complete circuits from factory supplied terminal strip as required. Provide and install conduit and two (2) wires from fire suppression micro-switch to terminal strip in junction box on top of designated exhaust hood as required. Furnish and install octagon shaped junction box for the fire suppression remote manual pull station in location approved by local fire marshal mounted 48"-54" AFF (VERIFY) and install 1/2" conduit from top of box to 6" above finished ceiling.

MECHANICAL CONTRACTOR: Provide the net room air demand of 830 CFM as indicated on the kitchen hood system contract drawings. This air volume is required only when hood system is in operation. Provide standard heating and air-conditioning to space as required whether system is in operation or not. Provide and install gas service to rooftop, gas-fired MUA unit per requirements listed on kitchen hood system contract drawings. Install mechanical gas shut-off valve in the main gas line that services the kitchen cooking equipment located under the hood(s). This valve shall be furnished by the KEC fire suppression sub-contractor. Mechanical contractor to VERIFY size required

ITEM 13 – Fire Suppression System (1 REQ'D)

Ansul R-102

FIRE SUPPRESSION SYSTEM: UL-300, **Ansul R-102** wet-type chem system INSTALLED including: Remote manual pull station, micro switches, fusible links, exposed chrome piping, mechanical gas shut-off valve

(Up to 2" O.D.), nozzle drawings, Indiana State submittals and permits, and (1) witnessed trip test for the local AHJ.

NOTES:

1. This fire system includes shutdown of the gas service to the appliances under the hood. Plumbing contractor to install the shut-off valve and verifying operation as required.
2. The EC shall be responsible for providing the electric service shutdown to the appliances under the hood, providing the control wiring from the gas solenoid shut-off valve to the microswitch, and the electric service shutdown to the make-up air fan as local codes may require.
3. NOT INCLUDED: K-Class fire extinguisher, control wiring, fire alarm, and alarm wiring.

ITEM 14 - KETTLE, ELECTRIC, TILTING (1 REQ'D)

Groen Model DEE/4-40C

Tilting Kettle, electric, 40-gallon capacity, 2/3 jacket, IPX6 water rated electronic Classic controls, 316 stainless steel liner, crank tilt, floor mounted control console, stainless steel construction, bullet feet, 50 PSI. 208/60/3 21KW, 59 Amps.

Accessories to Include:

- 1 ea. **Model 104278** Brush Set, 2", includes drain valve brush & paddle, for 2" TDO
- 1 ea. Etch Marks, 4-gallon increments
- 1 ea. **Model 159143** Hinged Cover Kit (no. 41), for 40-gallon tilting kettle, factory installed
- 1 ea. **Model 122891** Pan Carrier, for tilting floor model kettles (not available on DH-20 & DEE-20)
- 1 ea. **Model N25871** Faucet, single pantry, with 48" spray hose

EC to make electrical connections as required. PC to make water connections.

ITEM 15 - STEAMER, COUNTERTOP (1 REQ'D)

Groen Model COUNTERTOP STEAMER (existing to be relocated)

Existing Groen 3 pan Hypersteam steamer. HY-3E. 208/3, 39 Amps, Serial #3E29013MS

EC to make electric connections as required. PC to make water connections and extend drain floor sink

ITEM 16 - TILTING SKILLET BRAISING PAN, ELECTRIC (1 REQ'D)

Groen Model BPM-30EC

Braising Pan, electric, 30-gallon capacity, 10" deep pan, 38" pan height, IPX6 water rated electronic Classic controls, manual tilt, standard etch marks, faucet bracket, round tubular open leg base, stainless steel construction, bullet feet, 11.5kW 208/60/3, 32 Amps.

Accessories to Include:

- 1 ea. 2" Tangent draw-off with perforated strainer
- 1 ea. Model 159102 Drain cup & 8' hose assembly for TDO
- 1 ea. Model 162732 TDO Cleaning Brush (Replacement)

- 1 ea. Model Z079995 Lip Strainer, for tilting braising pans
- 1 ea. Model 150498 Drain Cart & Trough Assembly
- 1 ea. Model Z091869 Faucet, single pantry, with swing spout

EC to make electrical connections as required. PC to mount faucet and make water connections and extend drain from drain cart to floor sink.

ITEM 17 - CONVECTION OVEN, ELECTRIC (2 REQ'D)

Southbend Model SLES/20SC Dimensions: 64.8(h) x 38(w) x 38.5(d)

SilverStar Convection Oven, electric, double-deck, standard depth, solid state controls, interior light, aluminized steel rear, stainless steel front, top, sides & 6" legs, (2) 1/2 HP, (2) 12kW. 208/60/3, 34 Amps

Accessories to Include:

- 2 ea. Standard (1) year limited parts and labor warranty
- 2 ea. 6" Casters in lieu of legs

EC to make electrical connections as required.

ITEM 18 - DRAIN, FLOOR TROUGH (1 REQ'D)

Conover Custom Fabrication

Floor trough to be size and shape as shown on drawings (24" x 36" and 6" deep). Floor trough to be constructed of-14-gauge stainless steel, outer flange to be 2" on all sides. Grating to be anti-slip fiberglass. Trough to be sloped to drain. Tail piece OD to be 4". Include stainless steel removable strainer basket.

General Trades to provide concrete box out as shown on drawings. FSEC to supply floor trough to Plumbing Contractor for Installation. PC to make necessary drain connection. General Trades to backfill as needed.

ITEM 19 - SLICER WITH STAND - EXISTING (1 REQ'D)

SLICER WITH STAND – Existing to be Relocated

ITEM 20 - VEGETABLE PREP TABLE (1 REQ'D)

Conover Custom Fabrication

Size and shape as shown on drawings. Top to be sound deadened 14-gauge stainless steel. Integral sinks sized as shown and 10" deep. Backsplash to be 8" high. 16-gauge stainless steel undershelves as shown.

Accessories to include

- 1 each **T&S Model B-0231** Wall mounted Faucet
- 1 kt **Model B-0230-K** Installation Kit

2 each **T&S Mode B-3952** Lever Waste

PC to install faucets and lever wastes and make all necessary water and drain connections.

ITEM 21 - WIRE SHELVING (5 REQ'D)

Quantum Model 1848P Dimensions: 1(h) x 48(w) x 18(d)

Wire Shelf, 48"W x 18"D, 600 - 800 lb. capacity, green epoxy antimicrobial finish, NSF

4 ea. **Model P86P** Post with Leveling Legs, 86"H, numbered grooves in 1" increments, includes (1) W-PLI & (1) W-PLB, green epoxy antimicrobial finish, NSF

1 st. **Model WR-00HS** Casters, set of (4) 5" swivel (2 with brakes), polyurethane & stainless steel

ITEM 22 - CLEAN DISHTABLE (1 REQ'D)

Conover Custom Fabrication

Size and shape as shown on drawings. 14-gauge top with stainless steel legs and bullet feet. 8" high backsplash.

ITEM 23 - DISHMACHINE (1 REQ'D) – Existing to be relocated

Hobart Model AM-16-BAS-2

208/60/3 - Single point connection 52.5 Amps

EC to verify electrical with equipment. EC to make all necessary electrical connections. EC to wire between dishmachine vent fan control and condensate exhaust hood system. Refer to hood shop drawings. PC to make all necessary plumbing connections.

ITEM 24 - SOILED DISHTABLE/3 COMPARTMENT SINK (1 REQ'D)

Conover Custom Fabrication

Size and Shape as shown. Top to be 14-gauge stainless steel with sound deadening 8" high backsplash. Include pass-thru as shown. Provide bracket for disposer control panel. 16-gauge integral sinks, size as shown. Sinks to be 14" deep. Provide 16-gauge fully welded undershelf as shown on drawings. Stainless steel legs and bullet feet.

Accessories to Include:

2 Each **T&S Brass Model B-0290** Faucet

4 Each **Model B-0427** Supply Nipple, 3/4" x 2-1/2"

1 Each **T&S Model B-0133** Prerinse Faucet

1 ea. **Model B-TEE-EZK** EasyInstall Tee Assembly, chrome-plated

1 ea. **Model B-0109-01** Wall Bracket, 6"

1 kt. **Model B-0230-K** Installation Kit

FSEC provide disposer collar to stainless fabricator for factory installation into table.

PC to make all water and drain connections as required.

**ITEM 25 - DISPOSER (1 REQ'D)
InSinkErator Model SS-300-7-CC101**

SS-300™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 3 HP motor, stainless steel construction, includes syphon breaker, solenoid valve, flow control valve, removable splash baffle, stainless steel sink stopper, programmable CC-101 control center, auto reversing, timed run, post flush. 208/60/3 6 amps

1 ea. (1) year parts & labor warranty

1 ea. Standard height disposer body

Accessories to Include

T&S Brass Model B-0455 Vacuum Breaker

FSEC to provide #7 collar to Custom Fabricator to be factory welded into table item #24.

PC to install vacuum breaker and make all necessary water and drain connections. EC to make power connection as required and interwire between disposer and control panel. FSEC to mount disposer and disposer control panel.

**ITEM 26 - CONDENSATE EXHAUST (1 REQ'D)
Allied Air Model VDW Series**

CONDENSATE EXHAUST HOOD: (1) Avtec Exhaust only (3'-0" Long x 3'-0" Wide x 24" Tall) w/ Type 300 Series total s/s construction, full perimeter gutter, drain, removable s/s perforated duct protector, exhaust collar installed (VERIFY Location) and hanging brackets. Listed to meet NSF guidelines. Hood to include matching s/s trim panels from top of hood to finished ceiling as required (FSEC to verify height).

CONDENSATE EXHAUST FAN: (1) Direct drive, down discharge exhaust and UL 705 Listing. Fan includes disconnect switch, speed control (shipped loose), gravity backdraft damper, birdscreen and insulated roof curb for flat rubber roof (FSEC to Verify Pitch). Refer to kitchen hood contractor drawings to confirm size of roof cutout. JENcoFan SDBD-1250SC.800 CFM @ 0.625" s.p.

1/2 HP. 115/60/1.7 .80 Amps

RELAY BOX: Includes motor starter, overload protection and relay mounted and pre-wired in a remote steel box. Electrician to mount the box, and wire to the dishmachine control switch and exhaust fan disconnect.

INSTALLATION: FSEC to deliver and hang condensate hood complete w/ trim enclosure panels; provide and install 22-gauge, sealed aluminum ductwork, horizontal runs sloped from fan to hood, complete w/ backdraft damper as required; FSEC to locate & cut roof opening (metal deck ONLY), spot curb and set fan. FSEC to include Indiana State Submittals & Local Permits.

TEST & BALANCE: Start-up, test, and balance system, complete with documentation as required.

NOTE:

1. All final connections to exhaust fan and dishmachine control switch must be completed before balance technician reports to jobsite.

GENERAL NOTES:

1. NOT INCLUDED BY KEC: Service platforms, railings, structural work, ceiling work, electrical or plumbing work, control wiring, fire protection chases if required, framing openings, flashing curbs, and sealing or trimming of openings.

2. The deficit supply air, 800 CFM, must be provided by the owner's building system for proper operation.

WORK BY OTHER TRADES:

ROOFING CONTRACTOR: Set-in-place and flash roof curb (furnished and located by hood system supplier). Trim roof deck opening.

STRUCTURAL CONTRACTOR: Provide framing for roof curb opening as required. Provide any framed openings in floors or walls that may be required for ductwork routing.

ELECTRICAL CONTRACTOR: Provide power to rooftop condensate exhaust fan. Install relay box provided by KEC on wall above finished ceiling. Provide and install all control wiring from dishmachine control switch to relay box and from relay box to condensate exhaust fan.

MECHANICAL CONTRACTOR: Provide the net room air demand of 800 CFM as indicated on the kitchen hood system contract drawings. This air volume is required only when the condensate exhaust system is in operation. Provide standard heating and air-conditioning to space as required whether system is in operation or not.

ITEM 27 - SPARE NO.

ITEM 28 - HAND SINK (3 REQ'D)

John Boos Model PBHS-W-1410-P-SSLR-X

Pro-Bowl Hand Sink, wall mount, 14"W x 10" front-to-back x 5" deep bowl, splash mount faucet holes with 4" centers, 1-7/8" drain opening with basket drain, with left & right-side splashes, includes mounting bracket, all stainless steel construction, splash mount faucet included

FSEC to mount hand sink. Plumbing contractor to make all necessary water and drain connections.

ITEM 29 - PASS-THRU HEATED CABINET (2 REQ'D)

Traulsen Model AHF132WP-FHS

Spec-Line Heated Cabinet, Pass-thru, one-section, stainless steel exterior, aluminum interior, standard depth cabinet, full-height door or doors with Santoprene® EZ-Clean Gaskets, (3) clear coated adjustable shelves per section, microprocessor controls, 6" adjustable stainless steel legs. 208/115/60/1 7.8 Amps

Accessories to Include:

- 2 ea. 3 year service/labor warranty, standard
- 2 ea. Full height glass door in lieu of solid, per door - Kitchen Side
- 2 ea. Full height solid door, standard
- 2 ea. Thermometer side door: hinged on Left
- 2 ea. Rear door Hinged on Left
- 12 ea. Universal tray slide - per pair
- 4 ea. Additional coated shelf

EC to make electrical connection as required.

ITEM 30 - PASS-THRU REFRIGERATOR (2 REQ'D)

Traulsen Model AHT132WPUT-FHS

Spec-Line Refrigerator, Pass-thru, one-section, self-contained refrigeration, StayClear™ Condenser, stainless steel exterior, aluminum interior, standard depth, wide full-height door or doors with Santoprene® EZ-Clean Gaskets, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless-steel legs, 1/3 HP. 115/60/1, 7.2 amps. NEMA 5-15P cord and plug

Accessories to Include:

- 2 ea. 3 year service/labor, 5 year compressor warranty, standard
- 2 ea. Thermometer side door: hinged on left
- 2 ea. Rear door hinged on left
- 10 total. Additional coated shelf on pins
- 2 ea. Full height glass door in lieu of solid, per door - Kitchen Side

ITEM 31 - SPARE NO.

ITEM 32 - HOT FOOD TABLE -4 WELL (2 REQ'D)

Multiteria HLS66 HOT FOOD TABLE (4 WELL)

Essence series Hot Food Counter, 66" long x 34" wide, and 34" high. Counter bases to be constructed with 1"x1" square, 16-gauge stainless steel tubular frames with welded joints for heavy duty construction. 2"x1" vertical framework at front counters to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and *tightlink* fastening system. Stainless steel aprons on operator side for mounting controls, and on customer side for mounting tray slide. Where noted undershelves to be 19 gauge stainless, to end short of back counter for utility access, and to be removeable without the use of tools. Laminate panels where noted shall be 3/4" thick MDO with standard laminate. Laminate selection to be determined by owner/architect. Laminate shall have matching vinyl edge banding, bottom T-molding, laminate liner material for panel backing and louvers where required. Casters shall be adjustable height to include 3"

wheels, 6" overall height caster assembly. Galvanized steel will not be accepted in counter base. Countertop manufacturer to prewire and preassemble all equipment at factory with UL approvals, to include food shields and drop in equipment intact. All wiring circuits to be completely tested prior to shipment. Stainless steel countertop, 14 gauge with #4 finish, and 1-1/2" turndown on all sides. Stainless steel work ledge mounted on fold down brackets on operator side of counter, 8" wide, length as shown on drawings, flush with countertop. Open storage on operate side of counter with undershelf. Electrical connections in counter base with 8' cord sets. Counters to include *tightlink* interlocking mechanism. *Tightlink* to be tubular stainless-steel construction and to lock adjacent counters together by pulling counter body end channels together from top-to-bottom and front-to-back of counters. Construction to allow for utilities to run between counters.

Toe kick to be mounted with "L" bracket to counter framework. Removable with tools. Toe kick to be on front and exposed end of counter.

Tray slides to be 12" wide with inverted "V" runners. Tray slides to be constructed of 16-gauge stainless steel with ends and sides turned down and square at all corners, ground and polished. Support brackets to be adjustable for 1/4" height and level. Stainless steel fold down type. Mount on front panel at 32" AFF.

Drop-in hot wells, 4-well size, manifolded drains, bottom exit with ball valve, drain valve extension and flex hose. Each hot well to use a 1200-watt heat source with individual controls. UL listed and approved. Controls mounted in counter apron.

Food shield to span drop in and shall be completely installed at manufacturer. Food shield where noted to be 3-position type over drop-ins. Operator service to self-service with ease of convertibility, includes LED lighting, 3/8" clear tempered glass shelf, front glass and (2) end panels. 1"x2" supports to be mounted through countertop and into counter vertical framework. Lighting power switch to be mounted in counter aprons.

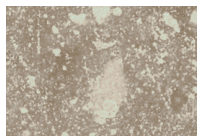
Plastic Laminate to be Wilsonart Standard Black 1595-60, Matte Finish. Sneeze guard posts to be black powder coat.

EC to make final electrical connections as required.

**ITEM 33 - COLD FOOD TABLE -2 WELL (2 REQ'D)
Multiteria CLS36 Cold Food Counter**

Essence series Cold Food Counter, 36" long x 34" wide, and 34" high. Counter bases to be constructed with 1"x1" square, 16-gauge stainless steel tubular frames with welded joints for heavy duty construction. 2"x1" vertical framework at front counters to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and *tightlink* fastening system. Stainless steel aprons on operator side for mounting controls, and on customer side for mounting tray slide. Where noted undershelves to be 19 gauge stainless, to end short of back counter for utility access, and to be removeable without the use of tools. Laminate panels where noted shall be 3/4" thick MDO with standard laminate. Laminate selection to be determined by owner/architect. Laminate shall have matching vinyl edge banding, bottom T-molding, laminate liner material for panel backing and louvers where required. Casters shall be adjustable height to include 3" wheels, 6" overall height caster assembly. Galvanized steel will not be accepted in counter base.

ABSTRACTS



5011K-22 TFL
POTTER'S CLAY
PREMIUM



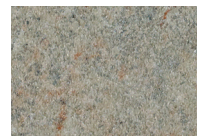
5005-38 TFL
SIERRA CASCADE



1872K-35
BIANCO ROMANO
HD PREMIUM



1854K-35
LUNA NIGHT
HD PREMIUM



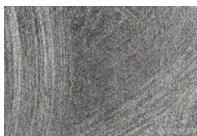
4656-60 TFL
BRONZE LEGACY



4663-60 TFL
TAWNY LEGACY



4651-60 TFL
NAVY LEGACY



4779-60 TFL
PEWTER BRUSH



4745-60 TFL
MAROOCHY BRUSH



4746-60 TFL
WOOLAMAI BRUSH



4913-60 TFL
EGGPLANT



4918-60 TFL
SPROUT



4915-60 TFL
TANGERINE



4919-60 TFL
BLUE AGAVE

WILSONART LAMINATE

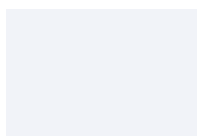
INNOVATIVE SOLUTIONS

Built directly into the laminate, Antimicrobial Protection defends the surface against damaging microbes such as mold and mildew that cause unpleasant odors. In combination with proper cleaning and disinfection protocols, protected surfaces can stay looking and performing better, longer. Antimicrobial Protection comes standard on all HD® finishes, and is available as an option on all other laminate designs.

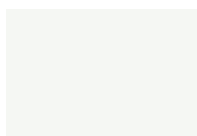


D498K-18 ISLAND

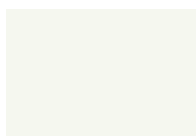
SOLID COLORS



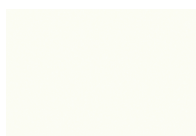
1570-60 TFL
WHITE



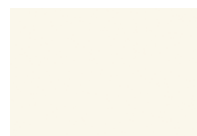
D354-60 TFL
DESIGNER WHITE



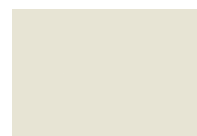
1573-60 TFL
FROSTY WHITE



D427-60 TFL
LINEN



D431-60 TFL
ALABASTER



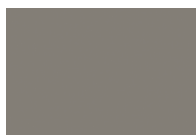
D388-60 TFL
CRYSTAL



1500-60 TFL
GREY



D92-60 TFL
DOVE GREY



D504-60 TFL
FOSSIL SHALE



D90-60 TFL
NORTH SEA



D381-60 TFL
FASHION GREY



D315-60 TFL
PLATINUM



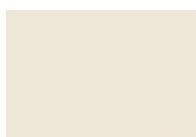
D503-60 TFL
CEMENT



D73-60 TFL
PEWTER



1595-60 TFL
BLACK



D439-60 TFL
WALLABY



D327-60 TFL
PEPPERDUST



D96-60 TFL
SHADOW

Countertop manufacturer to prewire and preassemble all equipment at factory with UL approvals, to include food shields and drop in equipment intact. All wiring circuits to be completely tested prior to shipment. Stainless steel countertop, 14 gauge with #4 finish, and 1-1/2" turndown on all sides. Stainless steel work ledge mounted on fold down brackets on operator side of counter, 8" wide, length as shown on drawings, flush with countertop. Open storage on operator side of counter with undershelf. Electrical connections in counter base with 8' cord sets. Counters to include *tightlink* interlocking mechanism. *Tightlink* to be tubular stainless steel construction and to lock adjacent counters together by pulling counter body end channels together from top-to-bottom and front-to-back of counters. Construction to allow for utilities to run between counters.

Toe kick to be mounted with "L" bracket to counter framework. Removable with tools. Toe kick to be on front and exposed end of counter.

Tray slides to be 12" wide with inverted "V" runners. Tray slides to be constructed of 16-gauge stainless steel with ends and sides turned down and square at all corners, ground and polished. Support brackets to be adjustable for 1/4" height and level. Stainless steel fold down type. Mount on front panel at 32" AFF.

Drop in cold pan, DI-2025TA (2) pan size, Temp-est Aire forced air refrigeration. Pans to rest flush on countertop, includes low velocity fans and cold wall design operating on R-507 refrigerant. Allows room for 6" deep pans (supplied by others), pan support bars for full size pans, condenser unit, insulated with drain. Self-contained refrigeration with compressor in cross ventilated housing. Pan to be fully separated from countertop by full perimeter breaker strip. Counter base to include louvered doors on operator side at compressor.

Food shield to span drop in and shall be completely installed at manufacturer. Food shield were noted to be 3-position type over drop-ins. Operator service to self-service with ease of convertibility, includes LED lighting, 3/8" clear tempered glass shelf, front glass and (2) end panels. 1"x2" supports to be mounted through countertop and into counter vertical framework. Lighting power switch to be mounted in counter aprons.

Plastic Laminate to be Wilsonart Standard Black 1595-60, Matte Finish. Sneeze guard posts to be black powder coat.

EC to make final electrical connections. PC to extend condensate line to floor drain.

ITEM 34 - CASHIER STAND/UTILITY COUNTER (2 REQ'D)

Multiteria CS30-MOD Cashier Counter (items are mirror image of each other)

Essence series Cold Food Counter, 36" long x 34" wide x 34" high.

General Construction as noted in items 32 and 33. Cashier counter to include grommet hole in top. (1) cashier drawer assembly with insert tray and 18-gauge stainless steel drawer face with lock and keys (drawers to be keyed the same), and removable 3" deep ABS drawer line, mounted on stainless steel roller bearing slides in counter apron. Open storage on operator side of counter, with undershelf. (1) empty data box mounted in counter base. Electrical connection box with 8' cord set. Tray slide with (3)

inverted "V" runners. Laminate on front and exposed end of counter. Toe kick on front and exposed end of counter.

Plastic Laminate to be Wilsonart Standard Black 1595-60, Matte Finish

EC to make final electrical connections.

**ITEM 35 - POS SYTEM (BY OTHERS) (1 REQ'D)
Custom Model POS SYTEM**

**ITEM 36 - MILK COOLERS (EXISTING TO BE RELOCATED) (1 REQ'D)
Custom Model MILK COOLERS**

**ITEM 37 - WIRE SHELVING (15 REQ'D)
Quantum Model 2448P**

Wire Shelf, 48"W x 24"D, 600 - 800 lb. capacity, green epoxy antimicrobial finish, NSF

16 ea. **Model P86PX** Post with Leveling Legs, 86"H, numbered grooves in 1" increments, includes (1) W-PLI & (1) W-PLB (pre-inserted), green epoxy antimicrobial finish

5 ea. **Model 2436P** Wire Shelf, 36"W x 24"D, 600 - 800 lb. capacity, green epoxy antimicrobial finish,

ITEM 38 - SPARE NO.

**ITEM 39 - UNDERCOUNTER ICE MAKER (EXISTING TO BE RELOCATED) (1 REQ'D)
Manitowoc Model UNDERCOUNTER ICE MAKER**

**ITEM 40 - EMPLOYEE LOCKERS EXISTING (1 REQ'D)
Custom Model EMPLOYEE LOCKERS**

**ITEM 41 - OFFICE DESK (1 REQ'D)
Custom Model OFFICE DESK**

**ITEM 42 - DRY STORAGE SHELVING (EXISTING TO REMAIN) (1 REQ'D)
Custom Model DRY STORAGE SHELVING**

**ITEM 43 - CAN RACK (EXISTING TO REMAIN) (1 REQ'D)
Custom Model CAN RACK**

**ITEM 44 - 3 DOOR REACH-IN REFRIGERATOR (EXISTING TO BE RELOCATED) (1 REQ'D)
Custom Model 3 DOOR REACH-IN REFRIGERATOR**

**ITEM 45 - MOP SINK CABINET (1 REQ'D)
John Boos Model PBJC-222584-X Dimensions: 84(h) x 25(w) x 22.5(d)**

Janitor Cabinet, 25"W x 22-1/2"D x 84"H overall size, enclosed cabinet with open back for plumbing, (2) lockable louvered swing doors, includes: 20" x 16" x 12" deep mop sink with drain, overhead shelf, rear-mounted mop holder with (2) locking cams, service faucet with vacuum breaker and 120" hose, 18/300 stainless steel, NSF

PC to mount service faucet and make necessary water and drain connections.

**ITEM 46 - MICROWAVE TABLE (EXISTING TO REMAIN/NOT SHOWN) (1 REQ'D)
Custom Model MICROWAVE TABLE
Existing table with microwaves for student access**

END OF SECTION 114000

SECTION 200010 – COMMON WORK RESULTS FOR FIRE SUPPRESSION, PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this and all Sections of Divisions 20, 21, 22 and 23.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Requirements of Regulatory Agencies.
 - 2. Abbreviations contained in Specifications.
 - 3. Shop Drawings.
 - 4. Record Drawings
 - 5. Operation and Maintenance Manuals.
 - 6. Drawings.
 - 7. Construction Documents.
 - 8. Work and Workmanship.
 - 9. Coordination between Contractors.
 - 10. Assignment of Miscellaneous Work.
 - 11. Equipment Warranty and Early Equipment Startup.
 - 12. Material Equipment Transport
 - 13. Material Storage.
 - 14. Product and Material Approval.
 - 15. Protection and Treatment of Property.
 - 16. Demolition and Removal of Equipment.
 - 17. Electrical Connections to Equipment and Control Wiring.
 - 18. Attaching to Building Construction.
 - 19. Rough-ins.
 - 20. Mechanical Installations.
 - 21. Cleaning and Touch-up.
 - 22. General Completion Startup/Owner Orientation.
 - 23. Air Filters.

1.3 REQUIREMENT OF REGULATORY AGENCIES

- A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- B. In case of difference between building codes, specifications, state laws, local ordinances, industry standards, utility company regulations and Contract Documents, the most stringent shall govern. Contractor shall promptly notify Engineer in writing of any such difference.

- C. Non-compliance: should Contractor perform any work that does not comply with requirements of applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- D. Applicable codes and standards shall include all state laws, local ordinances, utility company regulations and applicable requirements of the most recent editions of the following nationally accepted codes and standards:
 - 1. The Indiana Building Code. (IBC)
 - 2. The Indiana Electric Code.
 - 3. The Indiana Mechanical Code. (IMC)
 - 4. The Indiana Fuel-Gas Code.
 - 5. The Indiana Fire Code.
 - 6. The Indiana Plumbing Code. (IPC)
 - 7. The Indiana Elevator Code.
 - 8. The Indiana Handicapped Accessibility Code.
 - 9. National Fire Protection Associates (NFPA) codes and regulations.
 - 10. Regulations of the Indiana State Board of Health.
 - 11. Regulations of the Insurance Bureau of Indiana.
 - 12. Requirements of Factory Mutual (FM).
 - 13. Regulations of the Indiana Department of Fire Prevention and Building Services.
 - 14. The Americans with Disabilities Act (ADA).
 - 15. All local and municipal codes and/or regulations.
- E. Except as otherwise specified herein, all piping work and materials are to conform to the American Standards Association Code for Pressure Piping.
- F. All fired and unfired pressure vessels furnished and installed under this contract are to conform to all requirements of current edition of State of Indiana Rules and Regulations for Boilers and Unfired Pressure Vessels. Copies of all certificates of tests and construction as required by this code to be turned over to Owner.
- G. Permits: Contractor shall pay for all building permits required by work and permits for opening streets and for connection to various utilities, including fees for water meter installation and any other requirements necessary to carry out his work. Where streets or sidewalks are cut, same must be repaired to at least as good a condition as they were before, all at expense of this Contractor. Permits shall be posted in prominent place at building site properly protected from weather and physical damage.

1.4 ABBREVIATIONS CONTAINED IN SPECIFICATIONS

- A. AABC Associated Air Balance Council
- B. AASHTO American Assn. of State Highway and Transportation Officials
- C. ABMA American Bearing Manufacturers Association (formerly Anti-Friction Bearing Manufacturers Associates)
- D. ABMA American Boiler Manufacturers Association
- E. ACI American Concrete Institute
- F. ACIL The Association of Independent Scientific, Engineering, and Testing Firms
- G. ACPA American Concrete Pipe Association
- H. ADA Americans with Disabilities Act
- I. ADC Air Diffusion Council

J.	AFBMA	Anti-Friction Bearing Manufacturers Association (see ABMA)
K.	AGA	American Gas Association
L.	AIA	American Insurance Association
M.	AIHA	American Industrial Hygiene Association
N.	AISC	American Institute of Steel Construction
O.	AISI	American Iron and Steel Institute
P.	AMA	Air Moving & Conditioning Association
Q.	AMCA	Air Movement and Control Association International, Inc.
R.	ANSI	American National Standards Institute
S.	API	American Petroleum Institute
T.	AREA	American Railway Engineering Association
U.	ARI	Air-Conditioning and Refrigeration Institute
V.	ASA	American Standards Association
W.	ASA	Acoustical Society of America
X.	ASC	Adhesive and Sealant Council
Y.	ASHRAE	American Society of Heating, Refrigerating & Air-Conditioning Engineers
Z.	ASME	American Society of Mechanical Engineers
AA.	ASPE	American Society of Plumbing Engineers
BB.	ASTM	American Society for Testing Materials
CC.	AWS	American Welding Society
DD.	AWWA	American Water Works Association
EE.	AABC	Associated Air Balance Council
FF.	CAGI	Compressed Air and Gas Institute
GG.	CE	Corps of Engineers (U.S. Department of the Army)
HH.	CGA	Compressed Gas Association
II.	CISPI	Cast Iron Soil Pipe Institute
JJ.	CPPA	Corrugated Polyethylene Pipe Association
KK.	CTI	Cooling Tower Institute
LL.	DIPRA	Ductile Iron Pipe Research Association
MM.	DOT	Department of Transportation
NN.	EPA	Environmental Protection Agency
OO.	FAA	Federal Aviation Administration
PP.	FCC	Federal Communications Commission
QQ.	FDA	Food and Drug Administration
RR.	FIA	Factory Insurance Association
SS.	FCI	Fluid Controls Institute
TT.	FM	Factory Mutual System
UU.	HEI	Heat Exchange Institute
VV.	HI	Hydraulic Institute
WW.	HI	Hydronics Institute (Division of Gas Appliance Manufacturers Association)
XX.	INCE	Institute of Noise Control Engineering
YY.	IEEE	Institute of Electrical & Electronic Engineers
ZZ.	IRI	Industrial Risk Insurance
AAA.	ISA	International Society for Measurement and Control
BBB.	ITS	Intertek Testing Services (Formerly Inchcape Testing Services)
CCC.	MCAA	Mechanical Contractors Association of America
DDD.	MSS	Manufacturing Standardization Society of the Valve and Fittings Industry
EEE.	NACE	National Association of Corrosion Engineers
FFF.	NBS	National Bureau of Standards
GGG.	NCAC	National Council of Acoustical Consultants
HHH.	NCCA	National Coil Coaters Association

III.	NCPI	National Clay Pipe Institute
JJJ.	NCSPA	National Corrugated Steel Pipe Association
KKK.	NEBB	National Environmental Balancing Bureau
LLL.	NEC	National Electric Code
MMM.	NECA	National Electrical Contractors Association
NNN.	NEMA	National Electrical Manufacturers Association
OOO.	NETA	InterNational Electrical Testing Association
PPP.	NFPA	National Fire Protection Association
QQQ.	NIA	National Insulation Association (Formerly National Insulation and Abatement)
RRR.	NIST	National Institute of Standards and Technology (U.S. Department of Commerce)
SSS.	NUSIG	National Uniform Seismic Installation Guidelines
TTT.	OSHA	Occupational Safety & Health Administration (U.S. Department of Labor)
UUU.	PCA	Portland Cement Association
VVV.	PDI	Plumbing and Drainage Institute
WWW.	PPFA	Plastic Pipe and Fittings Association
XXX.	PPI	Plastics Pipe Institute
YYY.	RMA	Rubber Manufacturers Association
ZZZ.	SAE	SAE International
AAAA.	SAE	Society of Automotive Engineers
BBBB.	SMACNA	Sheet Metal & Air Conditioning Contractors' National Association
CCCC.	STI	Steel Tank Institute
DDDD.	SWPA	Submersible Wastewater Pump Association
EEEE.	UL	Underwriters Laboratories
FFFF.	UNI	Uni-Bell PVC Pipe Association
GGGG.	WSC	Water Systems Council

1.5 SHOP DRAWINGS

- A. Review of Shop Drawings does not relieve Contractor of responsibility for correct ordering of material and equipment.
- B. Contractor review should ensure that equipment will fit into available space.
- C. Shop Drawings shall be prepared and submitted in accordance with Division 1 "Submittals".
- D. Include all significant data on Shop Drawing Submittals shown in Specifications and Equipment Schedule. Including, but not limited to the following:
 - 1. Name each piece of equipment by scheduled name, noted as: "Mark No." as indicated on drawings, i.e., FC-A, CSAC-A, etc.
 - 2. Pressure drops at design flow.
 - 3. Electrical characteristics and wiring diagrams: Power, signal, and control wiring. Wiring diagrams must match the equipment provided. Custom factory wiring such as terminal strip designations must be provided. Costs associated with field changes required if accurate wiring diagrams are not provided shall be borne by the equipment manufacturer.
 - 4. Description of construction and material types and gauge of materials used.
 - 5. Entering and leaving air and or water temperature at design conditions.
 - 6. Performance characteristics/efficiency.
 - 7. Dimensional drawing showing locations of all field connections including piping, control, power and sheet metal as well as equipment configuration.

8. Dimensional drawing showing locations of all field connections including piping, control, power and sheet metal as well as equipment configuration.
 9. Note any special tools required for equipment service.
- E. Items Requiring Submittals:
1. Each individual section lists the required items to be submitted.

1.6 RECORD DRAWINGS

- A. Contractor shall be responsible for furnishing to Engineer a complete, accurate and neat set of marked-up blue-line drawings in accordance with Division 1. This set shall contain all deviations between actual construction and Contract Drawings.
- B. Contractor shall maintain a mark-up set of as-built drawings on the project site and shall keep all drawings up-to-date as construction progresses. This marked-up set shall be returned to Contractor, as many times as necessary, in order to obtain desired results.
- C. Engineer's employees shall inspect Drawings regularly on project site for accuracy and omissions. Pay request will not be approved if marked-up record drawings are not onsite and up to date.
- D. Refer to Division 1 "PROJECT CLOSEOUT" for further instructions.

1.7 CONSTRUCTION DOCUMENTS

- A. Construction documents shall include all divisions of specifications, all drawings and all issued addenda.
- B. In a case of conflict between the drawings and specifications, or between divisions of specifications, the most stringent condition shall apply.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Prepare Operation and Maintenance Manuals including the following information for equipment items:
 1. Complete index identifying contents of manual. Also provide a comprehensive list of manufacturers, suppliers, subcontractors, etc., with name of contact person, address and phone number for each manufacturer, supplier and subcontractor.
 2. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and exploded drawing of devices with names and part numbers of replacement parts.
 3. Complete set of reviewed shop drawings.
 4. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 5. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 6. Servicing instructions and lubrication charts and schedules.

7. Warranty letter from contractor stating general warranty and any extended warranty items included in this contract.
8. Refer to Division 1 "Contract Closeout" for additional instructions.

1.9 DRAWINGS

- A. Mechanical Drawings show general arrangement of all piping, equipment and appurtenances. They shall be followed as closely as actual building construction and work of other trades will permit. Mechanical work shall conform to requirements shown on all Drawings. General and Structural Drawings shall take precedence over Mechanical Drawings. Because of small scale of Mechanical Drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. Contractor shall investigate structural and finish conditions affecting work and shall arrange his work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions.
- B. For purpose of clarity and legibility, Drawings are essentially diagrammatic, although size and location of equipment and piping are drawn to scale wherever possible. Verify Contract Document information at site.
- C. Drawings indicate required sizes and points of termination of pipes and ducts and suggested routes. It is not the intention of Drawings to indicate all necessary offsets. Install work in manner to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear. Do not scale from Drawings.
- D. In case of a conflict in construction documents and or the specifications, Contractor shall receive clarification, prior to bidding, in the form of an addendum or include in his price, the greater amount of work of the conflicts shown. (i.e., if two pipe sizes are indicated for the same pipe, the Contractor shall price the larger of the two pipes.)

1.10 WORK AND WORKMANSHIP

- A. Provide all required labor, materials, equipment and Contractor's services necessary for complete installation of systems required in full conformity with requirements of authorities having jurisdiction; and as indicated on Drawings and herein specified.
- B. Finished job shall be functional and complete in every detail, including any and all such items required for a complete system, whether or not these items are specified or shown on drawings.
- C. Any apparatus, material or work not shown on Contract Drawings but mentioned in the Specifications, or vice versa, or any incidental accessories or minor details not shown but necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense to the Owner.
- D. Special attention shall be given to accessibility of working parts and controlling parts. Adjustable parts shall be within easy reach. Removable parts shall have space for removal.
- E. Each Contractor shall acquaint himself with details of all work to be performed by other trades and take necessary steps to integrate and coordinate his work with other trades.

- F. It is assumed the Mechanical Contractor is familiar with standard first-class installation procedures. Therefore, these Specifications do not attempt to include every detail or operation necessary for the complete installation.
- G. It should be particularly noted that the terms "furnish" and "provide" are interchangeable and that each of these terms means to provide, install and connect, unless otherwise stated.
- H. Whenever tables or schedules show quantities of materials, they shall not be used as a guide to Contractor. Each Contractor shall be responsible for furnishing all materials noted on Drawings and as specified.
- I. Craftsman trained in each respective trade shall install work in that trade.

1.11 COORDINATION BETWEEN CONTRACTORS

- A. Note: Respective contractor infers the contractor installing the work.
- B. Each Contractor and Subcontractor shall study all Drawings applicable to this work so complete coordination between trades will be affected. Special attention shall be given to points where ducts cross other ducts or piping, where lights fit into ceilings and where pipe, ducts and conduit pass through walls and columns. Temperature controls interface, where applicable, shall be given attention.
- C. It is responsibility of each Contractor and Subcontractor to leave necessary room for other trades. No extra compensation will be allowed to cover cost of removing piping, conduit, ducts or equipment found encroaching on space required by others.

1.12 ASSIGNMENT OF MISCELLANEOUS WORK

- A. Lintels required by Contractor in new or existing walls shall be furnished by Respective Contractor. Contractor shall be responsible for notifying other Contractor of correct size and locations for all lintels prior to wall construction.
- B. Painting: Other Contractor will provide prime painting on all ferrous metals such as supporting steel or hangers for mechanical piping and equipment. Piping itself is not to be primed. Any finish painting required, including painting of all mechanical items exposed to outside environment will be painted by Other Contractor.
- C. Roof Openings: required by Mechanical Contractor shall be cut by Other Contractor. Mechanical Contractor is responsible for correct size and location of same.
- D. Roof Curbs and Bases: for roof mounted mechanical equipment shall be furnished and anchored to structure by Respective Contractor.
- E. Flashing: for roof curbs and bases shall be furnished by Other Contractor.
- F. Counter flashing for roof curbs and bases shall be furnished by Other Contractor.
- G. Sanitary Vent Lead Pans and Flashing: by Other Contractor.

- H. Penetrations: holes required for piping or ductwork shall be cut in field at expense of Respective Contractor. Engineer shall give approval prior to any cutting.
- I. Holes required for piping or ductwork shall be cut at the expense of the Respective Contractor. Mechanical Contractor to coordinate location and size of all openings prior to building erection or he will assume all costs for providing openings.
- J. Excavating and Backfilling: for mechanical work shall be by Respective Contractor.
- K. Caulking of all plumbing fixtures shall be by Mechanical Contractor.
- L. All fire stopping of mechanical penetrations by Respective Contractor.
- M. All caulking of mechanical penetrations through interior partitions by Respective Contractor. All sleeve seals for mechanical penetrations through exterior below grade penetrations by Mechanical Contractor.
- N. Mechanical Contractor will install all taps, control valves and thermo wells in piping for all temperature sensors, flow switches, pressure sensors and any other control device installed in piping whether shown or not on the Drawings.
- O. Dust Protection:
 - 1. Temporary partitions or barriers required to protect existing building or facilities specifically in areas requiring primarily mechanical work; i.e., cross country pipe, etc., shall be provided by Other Contractor. Other Contractor shall coordinate necessity and location of such protection with Owner.
 - 2. Temporary filters and covers for protection of new and existing ductwork, piping, and equipment is required during construction and shall be by Respective Contractor.
- P. Pipe identification shall be by Mechanical Contractor as specified in Section 200050.
- Q. Kitchen Equipment: furnished and set in place by Other Contractor. Rough-in shall be by Respective Contractor. Final connections shall be by Respective Contractor.
- R. Temporary Use of Equipment: should it become necessary or desirable to operate any equipment before final acceptance, Owner shall be allowed to do so, ONLY after proper adjustments and trial operation by Contractor specified. Respective Contractor shall be responsible for instructing Owner, or his Representative, as to proper operation and care of equipment so used. If equipment is used prior to final acceptance of job, date of first usage will begin warrantee period.
- S. All electrical control wiring between mechanical equipment (i.e., air cooled chiller and condensing unit, respective indoor and outdoor equipment, etc.) shall be by Control Contractor. Conduit and wiring requirements shall adhere to those specified in Division 26.
- T. Cutting and Patching: Respective Contractor shall cut and patch finished areas as required by Mechanical Contractor.
- U. Wall Sleeves in new construction for Mechanical systems shall be provided by the Respective Contractor and coordinated by Mechanical Contractor.
- V. Wall Sleeves in existing construction shall be provided and installed by the Respective Contractor.

- W. Ceiling and Wall Access Panels: shall be located by mechanical contractor and installed by Respective Contractor.

1.13 EQUIPMENT WARRANTY AND EARLY EQUIPMENT STARTUP

- A. Contractor shall provide a complete warranty for all equipment, controls, etc. that includes parts and labor, any equipment that fails shall be repaired and/or replaced at no cost to owner.
- B. The warranty shall start on the date of substantial completion. On projects with multiple phases, the date of substantial completion of the final phase shall be the date that the warranty starts for all phases, i.e. the entire project. No exceptions.
- C. If special extended warranties exist, they will be noted in the respective sections. Extended warranty starts on the date of Substantial Completion of the final phase, unless another date is agreed to by all parties.
- D. If equipment startup is required to provide suitable climate conditions for carpentry finish trim, painting, ceiling tile installation, etc., then this contractor is responsible for starting, operating equipment and providing an extended warranty.
- E. Respective Contractor shall provide and change temporary filters over ductwork openings or grilles connected to air handling equipment operated prior to Owner occupancy and Substantial Completion for temporary heating and cooling. Respective Contractor shall submit equipment and ductwork dust protection measures prior to installation of equipment and ductwork.
- F. The “umbrella” warranty for the project shall be **one year**.
- G. Some devices such as Control Valves, VFD’s, etc. require extended warranties. Extended warranties are noted in the Specification Section for that piece of equipment. The prime Contractor shall be responsible for all implementation and cost of extended warranty work.

1.14 MATERIAL AND EQUIPMENT TRANSPORT

- A. All material and equipment, shipped to site, shall be suitably covered and protected during shipment to site.
- B. Protection shall include shrink wrapping and desiccant bags for humidity controls.
- C. Protect equipment from weather, road salts, road dirt, condensation, damage and all other situations that can be detrimental to the condition of the equipment and material being shipped.
- D. Engineer will not be on site during delivery; however, Engineer reserves the right to reject material or equipment after the fact that is delivered to site in unsatisfactory condition.

1.15 MATERIAL STORAGE

- A. Provide suitable protection from weather and vandalism for all materials and equipment to be installed. Storage shall be dry, clean and safe. Provide heat as required to stop condensation. Condensation occurs during periods of large ambient temperature swings, i.e. spring or fall. Any materials or equipment

damaged, deteriorated, rusted or defaced due to improper storage shall be fully repaired, refinished or replaced, as directed by Engineer at no additional cost.

PART 2 - PRODUCTS

2.1 PRODUCT AND MATERIAL APPROVAL

- A. A Specification followed by one or more manufacturers is limited to those manufacturers. Names of other manufacturers may be submitted for approval, to the Engineer, a minimum of ten calendar days prior to receiving bids. Approval will be issued by Addendum if approval is granted.
- B. The mechanical equipment shall be new, listed by UL and shall confirm to NEMA requirements.
- C. If changes in pipe, ductwork, conduit, wiring, structural support, ceiling space, etc. are required as a result of the contractor's decision to purchase equipment with a different arrangement than shown on the Drawings, the Contractor shall be responsible for including all associated costs in their bid. Manufacturers listed on schedules shall be considered "Basis of Design" (BOD). Note that manufacturers listed as equals may have physical characteristics such as weight, footprint, sound levels, electrical, etc., which require more coordination, piping, wiring, and/or general construction changes. The Mechanical Contractor will be responsible for all additional costs associated with the installation of this equipment. Contractors should seek clarification prior to bid for any equipment that does not meet or exceed the scheduled or specified characteristics.
- D. Manufacturers listed for products and equipment does not imply that their standard construction or configuration is acceptable or meets the specifications. Equipment proposed "as equal", must meet the specifications including all architectural, mechanical, electrical, and structural details, all scheduled performance and the job design, plans and specifications.

PART 3 - EXECUTION

3.1 PROTECTION AND TREATMENT OF PROPERTY

- A. Repair and replace all property damaged in installation of underground lines to meet approval of Owner and authorities having jurisdiction.
- B. Repair streets, which are part of State Highway System to satisfaction of State Highway Department.
- C. Replace base and wearing surfaces of streets with same kind and thickness of material as existing. Replace brick, concrete and asphalt surface to width 6" wider than disturbed area. Replace entire surface if more than 30% has been disturbed.
- D. Replace sidewalks, curbs, gutters, driveways, with same kind and thickness of material. Replace entire section of concrete walks or driveways.
- E. Re-grade and replant lawn areas.
- F. Protect existing utilities. Cap existing utilities that are abandoned.

- G. All property in existing facilities that is damaged/removed, by contractor operations shall be repaired/replaced to previous operating and appearance condition.

3.2 DEMOLITION AND REMOVAL OF EQUIPMENT

- A. Contractor shall remove all equipment, hangers and support for portion of mechanical system in present building as indicated on Drawings and/or implied by nature of the work to be removed. Contractor shall remove all pipes and ductwork back to source made obsolete by removing equipment unless specifically instructed otherwise.
- B. Contractor shall properly support remaining portions of the work. Contractor shall provide valves, plugs, vents, etc. as required so existing systems remain operational.
- C. Owner shall have first right of refusal on all equipment, piping, etc., being removed. If owner decides to keep removed items, then the contractor shall move items to a location on this project site as directed by owner.
- D. Openings remaining after equipment has been removed shall be patched to match surrounding surfaces and in conformance with good practice.

3.3 ELECTRICAL CONNECTIONS TO EQUIPMENT AND CONTROL WIRING

- A. All electrical work shall be done in accordance with the latest edition of the National Electric Code.
- B. All above ground wiring shall be installed in metallic conduit with a minimum conduit size of ¾ inch. All wiring shall be concealed, except in equipment rooms, crawl spaces, tunnels and mechanical or electrical closets. Conduit shall be fastened securely at regular intervals and shall be run parallel to the building lines.
- C. Running low voltage wire above bar joist in roof/floor metal deck flutes is not permitted. Wire to be run above bottom chord of truss and fastened to structure with wire ties at maximum 4' o.c.
- D. All flexible conduits shall not exceed 2 foot.
- E. All below ground wiring shall be installed in rigid conduit with minimum size of ¾". Conduit system shall be sealed watertight.
- F. Provide all wire, conduit, fittings, miscellaneous materials and labor as required for mounting and connecting the electrical control devices furnished in this contract.
- G. All wiring shall be continuous from point to point. No splicing between terminations allowed.
- H. In the event that a Supplier of equipment requires a larger starter, disconnect wiring conduit, etc. than those indicated in Contract Documents, he shall reimburse Contractor supplying these items for the difference.
- I. Connections and wiring diagrams shown on Drawings or described in Specifications are typical and for bidding purposes only. Detailed diagrams and instructions shall be provided by Contractor supplying the

equipment. If connections are different from those shown on Drawings, Mechanical Contractor shall reimburse Electrical Contractor for those differences.

- J. Additional relays switches, contactors, etc. which may be required for control purposes in addition to those specified and indicated on Drawings shall be provided by Mechanical Contractor.
- K. In the event that several pieces of mechanical equipment from different Suppliers are combined in one system, Mechanical Contractor shall furnish complete wiring and control diagrams to enable Electrical Contractor to make proper connections. Diagrams shall be submitted to Engineer for review, prior to actual wiring.
- L. Mechanical Contractor shall furnish to Electrical Contractor written notice of approval and acceptance for all control wiring installed for mechanical systems by Electrical Contractor. Such approval shall be given within 30 days of completion of all such control wiring. Two copies of letter shall be sent to Engineer.

3.4 ATTACHING TO BUILDING CONSTRUCTION

- A. Equipment and pipe supports shall be attached to structural members (beams, joists, etc.) rather than to floor or roof slabs. Support from structural members shall be in accordance with manufacturer recommendation of structural member and/or approved by Structural Engineer.
- B. Where piping is suspended from existing concrete or masonry construction, use expansion shields to attach pipe supports to construction.
 - 1. Anchors shall be installed horizontally into the sides (vertical portion) of concrete beams at a minimum of 5" from the bottom of the beam.
 - 2. When support location is between concrete beams, then Unistrut shall be attached to sides of concrete beams and span continuously between the concrete beams. Unistrut shall be sized per manufacturer's data to carry load.
 - 3. Contractor must receive prior approval before attaching to the underside of concrete slabs or concrete beams.
 - 4. Install all anchors according to manufacturer's written instructions. Expansion shield bolt diameter shall be same size as support rod diameter hereinafter specified. If, in the opinion of the Owner/Engineer, existing structure is questionable, an angle will be required with two expansion shields to carry each vertical support rod. Expansion shields shall be combined friction and keying hold type wedge anchor like HILTI Red Head or approved equal.
- C. Where existing masonry is not suitable to receive and hold expansion shields or where other means of attachment is advantageous, Contractor shall submit alternate method for approval of Engineer.
- D. Where piping is suspended from structural steel building framing or supporting members, furnish and install beam clamps for attaching piping support device to building member.
- E. Obtain approval from Engineer before cutting or welding to structural member or before hanging heavy equipment.
- F. Support piping and ductwork from structure so that equipment connections are not being used for support.

3.5 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be installed.
- B. Refer to shop drawings for equipment rough-in requirements.

3.6 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Keep all major equipment covered, in buildings, until major dust producing activities are complete. Equipment to be covered includes chillers, pumps, VFD's and AHU's.
 - 2. All equipment must be installed such that maintenance and service may be properly accomplished. If necessary, the Owner, at their option, may require the contractor to demonstrate the service on any piece of equipment to determine sufficient service space exists. If the service space is not adequate, the equipment shall be relocated at no additional cost to the Owner such that sufficient service space is achieved.
 - 3. Coordinate mechanical systems, equipment, and materials installation with other building components.
 - 4. Verify all dimensions by field measurements.
 - 5. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
 - 6. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 7. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 8. Where mounting heights are not detailed or dimensioned, install systems, material, and equipment to provide the maximum headroom possible.
 - 9. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 10. Install systems, materials, and equipment to conform with engineer reviewed submittal data. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
 - 11. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
 - 12. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
 - 13. Extend grease fittings to an accessible location.
 - 14. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at specified slope.
 - 15. All shutdowns required to connect to existing systems shall be scheduled and coordinated with the Owner. Contractor shall prefabricate and install new materials as much as possible to keep shutdown duration to a minimum.

16. All pipe, duct and mechanical equipment shall be installed as high above floor (close to structure) as possible. When any pipe, duct or mechanical piece of equipment is installed lower than 7'-0" above finished floor, foam type insulation with black and yellow caution marker tape shall be installed on bottom leading edges.
17. Contractor shall field verify all locations, sizes and connection points to existing piping, ductwork and systems as shown on the drawings. Contact Engineer with any discrepancies.
18. Provide all contact information to Test and Balance Contractor 30 days prior to start-up of equipment.
19. Contact Test and Balance Contractor after leakage and pressure test on air and water systems has been successfully completed.

B. Platforms and Supporting Stands

1. Each piece of equipment or apparatus suspended from ceiling or mounted above floor level shall be provided with suitable structural support, platform or carrier, in accordance with best recognized practice.
2. Contractors shall exercise extreme care that structural members of building are not overloaded by such equipment. In all cases, details of such hangers, platforms and supports, together with total weights of mounted equipment, shall be approved by Engineer.

C. Drive Guards

1. All belt-driven equipment shall have belt guards with provisional slot for tachometer reading access at shaft. All rotating equipment and drives shall have safety guards.

3.7 CLEANING AND TOUCH UP

- A. All mechanical equipment, cabinets, control panels and other enclosures shall be cleaned and have paint touched up as necessary to duplicate factory finished appearance. Touch up paint shall exactly match color, composition and quality of factory applied finish.
- B. Equipment furnished with factory applied finish shall be protected from damage by the installing Contractor. Any damaged surface shall be repaired or replaced by the installing Contractor to match original finish or shall be replaced before final acceptance.

3.8 GENERAL COMPLETION, STARTUP

- A. Work Included: furnish materials and labor required to perform startup of equipment and systems installed on project and provide operating instructions to Owner.
- B. It is Mechanical Contractors' responsibility to conduct an owner orientation meeting which will review all systems, their operation and operation of all equipment.
- C. General Requirements.
 1. Inspect bearings for cleanliness and alignment and remove any foreign materials found. Grease as necessary and in accordance with manufacturer's recommendations. Replace bearings that run rough or noisy.

2. Adjust tension in V-belt drives, adjust vari-pitch sheaves and drives for proper equipment speed. Change belts and sheaves if necessary to obtain proper equipment speed; remove any foreign materials from sheaves or belts before starting operations; adjust drives for alignment of sheaves and v-belts. Construe proper speed as that which produces intended performance. Change sheaves so that design CFM is achieved when VFD is at 100%. Slowing VFD to meet maximum design CFM is not acceptable.
3. Tighten flanges and packing glands after system has been placed in operation. Replace gaskets in flanges that show any signs of leakage after tightening.
4. Inspect screwed joints for leakage and remake each joint that appears to be faulty. Do not wait for rust to form. Clean threads on both parts, apply compound and remake joint.
5. Adjust pipe hangers and supports for correct pitch and alignment.
6. Flush systems and clean all strainers. After 30 days of operation clean strainers again.
7. Provide such continuing adjustment services as is necessary to ensure proper functioning of all mechanical systems after building occupancy and during guarantee period.
8. Provide duct stiffeners, air straighteners, or turning vanes as required to stop any oil canning, drumming or fan surge to the satisfaction of the engineer.

3.9 AIR FILTERS

- A. Provide a total of three (3) sets of air filters for each piece of equipment for Owner use after Substantial Completion has been awarded.
- B. Never operate equipment without air filters. Contractor shall provide construction set of air filters, as needed during construction for equipment operation prior to Substantial Completion.
- C. Replace construction air filters in each and every piece of equipment within 2 weeks after substantial completion and prior to Testing and Balancing.

END OF SECTION 200010

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**SECTION 200050 – COMMON MATERIALS AND METHODS FOR FIRE SUPPRESSION, PLUMBING AND
HVAC**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this and all Sections of Divisions 20, 21, 22 and 23.

1.2 SUMMARY

- A. Provide equipment, materials, labor and services common to more than one section of Divisions 20, 21, 22 and 23. The work generally includes, but is not limited to the following:
 - 1. Electric Motors
 - 2. Sleeves
 - 3. Mechanical Sleeve Seals
 - 4. Elastomeric Joint Sealants
 - 5. Equipment Identification
 - 6. Thermostats and Sensors
 - 7. Roof & Wall Penetrations

1.3 SUBMITTALS

- A. If specified products are provided, submittals are not required for products provided in this section.
- B. If it is desired to use products that are not specified, then those products must be submitted for review prior to ordering said products.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTORS

- A. Service:
 - 1. Constant Speed Motors: PREMIUM-EFFICIENCY, NEMA Design B, Class B insulation, nameplated and designed for electrical characteristics noted on Drawings in accordance with NEMA and IEEE Standards.
 - 2. Variable Speed Motors: PREMIUM-EFFICIENCY, NEMA Design B, drive rated with Class F insulation, nameplated and designed for electrical characteristics noted on Drawings and in accordance with NEMA and IEEE Standards. All end plates shall be cast iron. Aluminum end plates are not acceptable.

- a. Variable speed motors shall include installation of a maintenance free, circumferential, conductive micro-fiber shaft grounding brush to divert shaft currents to ground. Aegis model SGR or approved equal.
 - b. Variable speed motors shall be in compliance with NEMA MG1-2006, Part 31, Section 4.4.2 as pertains to voltage spikes. (This is to help prevent premature motor winding failures when there is a long cable distance between VFD and motor).
- B. General: Motor shall be at least HP specified.
- C. Bearings: Ball, sleeve or roller bearings with dustproof rings.
- D. Temperature Rise: Continuous rating at 104°F (40°C) above ambient.
- E. Base: Cast iron or steel with adjustable slide rail.
- F. Rating: Motors specified for voltage of 220 to 240 volts and 440 to 480 volts shall have 230/460 rating. Motors specified for voltage of 208 volts shall be designed and nameplated for 200 volts.
- G. Enclosures:
 - 1. Hazardous Locations:
 - a. Explosive Liquid Vapor and Gasses: Class I Explosion Proof.
 - b. Combustible Dust (i.e., Coal, grain flower:): Class II - Dust Ignition Resistant.
 - 2. Outside: Totally Enclosed Fan Cooled (TEFC).
 - 3. All others: Open Drip-Proof (ODP) unless noted otherwise with a specific piece of equipment.

NEMA Premium™

Product Scope and Nominal Efficiency Levels

The NEMA Premium™ efficiency electric motor program scope is single-speed, polyphase, 1-500 horsepower, 2, 4 and 6 pole, squirrel cage induction motors, NEMA Design A or B, continuous rated. Products must meet or exceed the nominal energy efficiency levels presented below:

Table 1 Nominal Efficiencies for “NEMA Premium™” Induction Motors Rate for 600 Volts or Less (Random Wound)						
	Open Drip-Proof			Totally Enclosed Fan-Cooled		
HP	6-pole	4-pole	2-pole	6-pole	4-pole	2-pole
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5

5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1

H. Sizing:

1. Select motors to have required capacity to operate driven equipment under all conditions of operation without overload.
2. Do not include motor service factor when determining motor size.

I. Manufacturers:

1. Allis Chalmers
2. General Electric
3. Louis Allis
4. Reliance
5. Westinghouse
6. Century
7. Marathon
8. Baldor

2.2 SLEEVES

- A. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, 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.
- E. Sleeves shall be in accordance with following schedule unless otherwise specified.

PIPE SIZE	UNINSUL.	1" INSUL.	1-1/2" INSUL.	2" INSUL.
1"	2	4	6	6
1-1/2"	3	4	6	8
2"	3	6	8	8
3"	4	6	8	10
4"	6	8	10	10
6"	8	10	12	12
8"	10	12	12	14

2.3 MECHANICAL SLEEVE SEALS

- A. Description: Modular design with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.
- B. Manufacturers: Thunderline/Link-Seal; Calpico, Inc.; MetraFlex Co.

2.4 ELASTOMERIC JOINT SEALANTS

- A. Sealant: Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated. Per ASTM C 920 like Dow Corning 995 GE Silicones, Tremco Spectrum 1 or equal.
- B. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26°F (minus 32°C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance. Verify compatibility with Elastomeric Joint Sealant Manufacturer prior to use.
- C. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- D. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

2.5 PLASTIC LAMINATE SIGNS FOR EQUIPMENT IDENTIFICATION

- A. ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore.
 - 1. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.

2. Punch for mechanical fastening.
3. Thickness: 1/8 inch (3.2mm) , unless otherwise indicated.
4. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
5. Nomenclature: Name and plan number as shown on Equipment Schedules and on Drawings or as directed by the Owner.
6. Size: Approximate 2 1/2 by 4 inches (65 by 100mm) for control devices, dampers, and valves; and 4 1/2 by 6 inches (115 by 150 mm) for equipment.

2.6 THERMOSTATS AND SENSORS

- A. Refer to individual equipment specifications and temperature controls specifications for device specifications.

2.7 ROOF AND WALL PENETRATIONS

- A. Roof penetration "Roof Vault" by Roof Penetration Housings, LLC. or approved equal.
- B. Wall penetration "Wall Vault" by Roof Penetration Housings, LLC. or approved equal.

PART 3 - EXECUTION

3.1 ESCUTCHEONS

- A. Escutcheons: Manufactured wall, ceiling and floor plates; deep-pattern of type required to conceal protruding fittings and sleeves.
 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 2. OD: Completely cover opening and sleeve.
- B. Cast Brass: One piece, with set screw.
 1. Finish: Rough brass.
 2. Finish: Polished chrome-plate.
- C. Cast Brass: Split casting, with concealed hinge and set screw.
 1. Finish: Rough brass.
 2. Finish: Polished chrome-plate.
- D. Install pipe escutcheons for exposed pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
 2. Un-insulated Piping Wall Escutcheons: Cast brass or stamped steel, with chrome-plated finish and set screw.
 3. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.

3.2 SLEEVES / PENETRATIONS

- A. Sleeves are not required for core drilled holes through poured in place concrete walls.
- B. Install sleeves for pipes and ducts passing through masonry walls, fire rated gypsum-board partitions, gypsum-board partitions with dry wall on both wall faces, and concrete floor slabs.
- C. Sleeve length to be a minimum of 1" longer on each side of wall penetration.
- D. Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- E. Build sleeves into new walls and slabs as work progresses. Core drilling of poured in place concrete walls is acceptable.
- F. Install sleeves large enough to provide 1/4 inch (6.4 mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1. Steel Pipe Sleeves: For pipes smaller than 6 inch NPS (DN150).
 - 2. Steel, Sheet-Metal Sleeves: For pipes 6 inch NPS (DN150) and larger, penetrating gypsum-board partitions.
 - 3. Cast-iron "wall pipes" for sleeves 6 inches (150 mm) in diameter and larger.
 - 4. 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 (50 mm) above finished floor level.
- G. When sleeve is installed in existing floor or masonry wall, seal space between sleeve and wall with non-shrink, nonmetallic grout.
- H. Above Grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
- I. Below Grade Exterior-Wall, Floors of Mechanical Spaces or other wet areas Pipe Penetrations: Seal penetrations using mechanical sleeve seals. Size for 1-inch (25-mm) annular clear space between pipe and opening for installing mechanical sleeve seals.
 - 1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- J. Fire-Barrier Penetrations:
 - 1. Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe and duct penetrations. Seal penetrations with fire sealants and caulks.
 - 2. This assembly must maintain a watertight seal between floor or wall and pipe when used on exterior walls, or floors of wet areas. Also use mechanical link seals in these cases.
 - 3. Use intumescent sealant for applications where combustible penetrants are involved (i.e., insulated or plastic pipe).
 - 4. Install in all penetrations where required by code.
- K. Sealant Application

1. Install sealants around all piping and duct penetrations.
2. Comply with sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
3. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of sealants as applicable to materials, applications, and conditions indicated.
4. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
5. Install sealant backings of type indicated to support sealants during applications and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of sealant backings.
 - b. Do not stretch, twist, puncture, or tear sealant backings.
6. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - a. Place sealants so they directly contact and fully wet joint substrates.
 - b. Completely fill recess between pipe and opening.
 - c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - d. Remove excess sealants from surfaces adjacent to joint.
 - e. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of product in which joints occur.

3.3 EQUIPMENT IDENTIFICATION

- A. Install engraved plastic-laminate sign on each scheduled piece of mechanical equipment.
 1. Lettering Size: Minimum 1/4 inch (6.4 mm) high lettering for name of unit if viewing distance is less than 24 inches (610 mm), 1/2 inch (12.7 mm) high lettering for distances up to 72 inches (1800 mm) and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principle lettering.
 2. Text of Signs: Provide specific name of unit as identified on Equipment Schedule on Drawings or as directed by the Owner. Inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 3. Locate identifying devices as necessary for unobstructed view in finished construction.
 4. Where equipment is located above lay-in ceiling, affix a 1" adhesive label on ceiling grid system below equipment with equipment tag identification. Verify description requirements with Owner/Engineer. Where equipment is located above inaccessible ceilings, affix label or engraved plastic laminate sign securely to or near access panel.

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment.

- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code – Steel".

3.5 EXCAVATION AND BACKFILLING

- A. Properly support banks of excavation with safety sheet pile. Install barricades, fences, guards, etc. as required for safety and by OSHA.
- B. Provide adequate pumping equipment and keep excavation free of water.
- C. Excavate pipe trenches to proper depth and slope as required for piping
- D. Pipes passing under or through footings shall be sleeved (minimum two pipe sizes larger than pipe).
- E. Pipes passing under or through corrosive fills shall have external coating to protect from corrosion.
- F. Support and protect underground piping so it remains in place without settling and without damage during and from backfilling. Replace any piping so settled or damaged. Pipe shall not be supported on blocks to grade.
- G. Lay underground piping on 6" bed of sand. Sand to fill from trench bottom to 6" above top of pipe. Carefully fill sand around pipe being sure that there is a complete smooth layer below pipes with no voids.
- H. Backfill with clean earth, crushed rock, gravel or sand. Use only sand inside buildings. Fill first two feet in 6" lifts and remainder in 12" lifts. Tamp and puddle each layer.
- I. Provide 6" wide marker tape buried directly underground above utility lines continuously along length of pipe. Marker tape shall be a minimum of 12" above utility line. Marker tape shall be a minimum of 6" wide.
- J. Replace all surfaces with like, kind, i.e. grass, road, sidewalk, etc., or as specified elsewhere.

3.6 THERMOSTATS AND SENSORS

- A. Unless specifically noted otherwise, install all wall-mounted thermostats and sensors required for respective equipment with at 48" A.F.F. to top of device box. Closely coordinate rough-in locations with all trades.

3.7 ROOF AND WALL PENETRATIONS

- A. Provide pre-manufactured curb or wall box with piping exit seals for moisture tight penetrations. Do not run insulation thru the exit seals. Exit seals to seal tight to carrier pipe.

END OF SECTION 200050

**SECTION 200060 – PIPE, VALVES, FITTINGS AND HANGERS FOR FIRE SUPPRESSION, PLUMBING AND
HVAC**

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 specifies piping, valves and fittings including piping support for all systems. These systems include the following:
 - 1. System Piping Schedule #13
Coil Condensate
 - 2. System Piping Schedule #14
Sanitary Inside Building
Vent Inside Building
 - 3. System Piping Schedule #17
Domestic Hot Water Aboveground
Domestic Cold Water Aboveground
 - 4. System Piping Schedule #20
Gas Piping
- B. All specialty valves for specific systems are listed in specification sections for those systems. Specialty valves for specific systems can be found in the following sections:
 - 1. Plumbing Specialty Valves – 220000 “Plumbing”
 - 2. Fire Protection Specialty Valves – 210000 “Fire Protection”
 - 3. Refrigeration Specialty Valves – 230000
 - 4. Hydronic Specialty Valves – 230000 “Heat Transfer”
 - 5. Control Valves – 230000 “Temperature Controls”
- C. Related sections include the following:
 - 1. 200010 Common Work Results for Fire Suppression, Plumbing and HVAC
 - 2. 200050 Common Materials and Methods for Fire Suppression, Plumbing and HVAC
 - 3. 200180 Common Insulation for Plumbing and HVAC
 - 4. 210000 Fire Suppression
 - 5. Division 22 Plumbing
 - 6. Division 23 Mechanical

1.3 SUBMITTAL

- A. Submit product data for valves and fittings used in each system.
- B. Submittal data to be in compliance with Section 200010.
- C. Product data shall include pressure and temperature classifications, model numbers, material types, actuators, trim, valve handle extensions and all pertinent data as required for complete evaluation by Engineer.
- D. Maintenance data for valves shall include adjusting, servicing, disassembly, exploded view with part numbers and repair instructions.
- E. Piping submittals are not required. However, piping to meet all specifications.

1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.
- C. All grooved joint couplings, fittings, valves and specialties shall be products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
- D. Welded and Soldered Pipe
 - 1. Pipe welding shall comply with provisions of latest revision of applicable code, whether ASME Boiler & Pressure Vessel Code, ASTM Code for Pressure Piping, or such state or local requirements as may supersede code mentioned above.
 - 2. A copy of his welding procedure specification together with proof of its qualification as outlined and required by most recent issue of code having jurisdiction.
 - 3. Submit Operator's qualification record in conformance with provisions of code having jurisdiction, showing that operator was under proven procedure specifications submitted by Contractor.
 - 4. Standard procedure specifications and operators qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements of these specifications.
 - 5. Welders to have ASME test papers not more than 5 years old.
 - 6. Each manufacturer or Contractor shall be responsible for quality of welding done by his organization and shall repair or replace work not in accordance with these specifications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set globe and gate valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.

6. Set butterfly valves closed or slightly open.
- B. Use the following precautions during storage:
 1. Maintain valve end protection.
 2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
 3. Stack piping above grade and covered.
- C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 PIPE MATERIAL DESIGNATIONS

- A. Refer to System Schedules in Execution portion of this Section for designation of pipe types to be used for each piping system. When more than one piping type is designated, contractor may choose which type is installed.
- B. Piping Designations
 1. CP-2 Steel:
 - a. 3/4" to 2" ASTM A53, Type S (seamless) or Type F (furnace-butt welded) Grade A Black steel (galvanized if so noted). U.S. Steel; Laclede; Republic; Youngstown, Jones & Laughlin.
 - b. 2-1/2" to 12" ASTM A53, Type E (electric resistance welded) Grade A Black steel (galvanized if so noted).
 - c. 14" to 20" ASTM A53, Type E (electric resistance welded) Grade B or Type S (seamless), (galvanized if so noted). U.S. Steel; Laclede; Republic; Youngstown; Jones & Laughlin.
 2. CP-8 Copper: ASTM B75, B88, B251 and B447; ASA H23.1-1947 seamless copper tubing, hard temper (soft copper if so noted). Type K or L. (as noted) Chase; Bridgeport, Anaconda; Scovill.
 3. CP-30 PVC: polyvinylchloride; ASTM D 1785 schedule as noted. As manufactured by A.M. Byers; U.S. Steel; Carlon, Crescent; **normal or high impact as noted.**
 4. CP-33 PVC DWV Drainage Pipe: ASTM D2665, Polyvinylchloride pipe solid-wall, waste, and vent. Schedule as noted.
 5. CP-40 Cast Iron (HUB) Bell and Spigot: ASTM A74, extra heavy bell and spigot cast iron soil pipe centrifugally metal or sand spun cast with asphaltum coating. American Brass & Iron; Tyler; Charlotte. Pipe and fittings shall be labeled with the trademark of the Cast Iron Soil Pipe Institute.
 6. CP-41 Soil Pipe: Cast Iron no hub ASTM A888, CISPI 301. No hub cast iron soil pipe centrifugally metal or sand spun cast with asphaltum coating. American Brass & Iron; Tyler; Charlotte. Pipe and fittings shall be labeled with the trademark of the Cast Iron Soil Pipe Institute.

2.2 PIPE FITTING DESIGNATIONS

- A. Refer to System Schedules in Execution portion of this Section for designation of fitting types to be used for each piping system. Fittings to be of the same strength of piping in each respective piping system. When more than one type is designated, contractor may choose which type is installed.
- B. Fitting Designations:
 - 1. CF-1 Malleable Iron: ASME B16.3. 300# (or as noted) black band malleable iron threaded fitting (galvanized if so noted). Flagg; Kuhns; Illinois Malleable, Stockham, Anvil.
 - 2. CF-8 Wrought Copper: ASME B16.22. Wrought copper solder joint fitting as manufactured by Flagg; Mueller; Chase, NIBCO; Anaconda; American Brass.
 - 3. CF-8A Wrought Copper Cold Press Fitting: Fitting specifically design to be field installed with hand held portable press tool. Fitting to be certified by NSF, UL and be compliant with ICC, UPC, PHCC, NFPA13, 13D and 13R. Fittings to be ProPress Smart Connect installed by RIGID Portable Press tool.
 - 4. CF-30 PVC: Polyvinylchloride; same schedule and impact as noted. Schedule 40 ASTM D 2466 Socket Type, Sch 80 ASTM D 2467 Socket. Carlon; Crescent; A.M. Byers; U.S. Steel; Chemtrol.
 - 5. CF-33 PVC Drainage Fittings: ASTM D2665, socket type, made to ASTM D 3311 drain waste and vent patterns.
 - 6. CF-40 (HUB) Bell and Spigot: Cast iron bell and spigot Type fitting DWV configuration, extra heavy duty. American Brass & Iron; Tyler; Charlotte.
 - 7. CF-41 (NO-HUB) Mechanical Joint: Cast iron no hub type fitting - DWV configuration. American Brass & Iron; Tyler; Charlotte.

2.3 PIPE JOINT DESIGNATIONS

- A. Refer to System Schedules in Execution portion of this Section for designations of joint types to be used for each piping system. When more than one type is designated, contractor may choose which type is installed.
- B. Piping Joint Designations:
 - 1. CJ-1 Threaded: threads shall conform to ASME B1.20.1, ASTM B16.3, B16.4, B16.12. Remove all burrs. Ream pipe ends to full bore and remove all chips. Use pipe compound on male ends only. Approved pipe compounds: Blue Seal; Key Tite.
 - 2. CJ-8: 95% tin, 4.85% copper, 0.15% selenium. Premium Contractor Grade solder. 410°F Minimum working temperature; 7130 PSI Tensile Strength, ASTM B32. Like Taramet Sterling, Taracorp. IMACO, Winston-Salem, NC. Cut ends of tubing square with wheel type cutter, ream to remove burrs, wipe clean on inside, apply paste type solder flux on external surface. Apply solder (no lead allowed).

3. CJ-8A: Cold Press connection 0-250°F, 200 psig. Connection made using a hand held portable press system. Joint to be certified by NSF, UL and be compliant with ICC, UPC, PHCC, NFPA13, 13D and 139 like RIGID VIEGA ProPress System.
4. CJ-33 PVC/CPVC
 - a. Solvent Cement: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1) Comply with ASTM F 402 for safe-handling practice of cleaners, primers and solvent cements.
 - 2) ABS piping: ASTM D 2235 and ASTM D 2661.
 - 3) CPVC Piping: ASTM D 2846 and ASTM F-493.
 - 4) PVC Pressure Piping: ASTM D 2672.
 - 5) PVC Non-pressure Piping: ASTM D 2665.
 - 6) PVC to ABS Non-pressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
 - b. Heat Welding: ASTM D 2657
 - c. Threads: Use only where noted on schedules. Install as outlined for steel pipe but only to be used on Schedule 80 or 120 pipe. Use strap wrench for tightening.
5. CJ-40 (HUB) Bell & Spigot: Gasket-ASTM C 564, Rubber. American Brass & Iron; Tyler; Charlotte.
6. CJ-41 (No HUB) Coupling: Stainless steel couplings CISPI 310 with ASTM A 167, Type 301 or ASTM A 666 Type 301 Stainless steel corrugated shield; stainless steel bands and sleeve. American Brass & Iron; Tyler; Charlotte.

2.4 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 1. Manufacturers:
 - a. Eslon Thermoplastics.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimension; one end with threaded brass insert, and one solvent-cement-joint end.
 1. Manufacturers:
 - a. Thomson Plastics, Inc.
- C. Plastic-to-Metal Transition Unions: MSS SP-107, PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 1. Manufacturers:
 - a. NIBCO, Inc.

- b. NIBCO, Inc.; Chemtrol Div.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company/
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300- psig minimum working pressure as required to suit system pressures.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
 - 1. Manufacturers:

- a. Calpico, Inc.
 - b. Lochinvar Corp.
- G. Dielectric Nipples: Electroplated steel nipple with inert and non-corrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
 - 1. Manufacturers:
 - a. Perfection Corp.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Co., Inc.
 - d. Victaulic Co. of America
 - e. Anvil/Gruvlok

2.6 UNIONS AND FLANGED CONNECTIONS

- A. 150 pound malleable iron with ground joint and brass to iron seats. Crane 1280.
- B. 125 pound wrought copper or cast brass union with solder joint fittings. Crane 633.
- C. 150 pound forged steel flanges with welding neck. Crane 568.
- D. 150 pound bronze flanges with tube stop. Mueller F900.

2.7 VALVE DESIGNATIONS

- A. Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.
- B. All valves shall be compatible with the type of piping material installed in the system.

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

1	Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.		
2	VALVE DESIGNATION	CV-4	
3	TYPE	Globe	
4	MAXIMUM WORKING		
4.1	Pressure - PSIG	125	
4.2	Temperature - °F	Sat. Stm.	
5	SIZE LIMITS - Inches	1/2 - 2 1/2	
6	DESCRIPTION		
6.1	Body	Bronze	
6.2	Trim	Bronze	
6.3	Disc/plug	Renewable Composite	
6.4	Bonnet	Screw-in	
6.5	Stem	Rising-Silicon Bronze	
6.6	Seat	Integral	
6.7	Agency Compliance	MSS SP-80	
	APPROVED PRODUCTS	Soldered	Threaded
7.1	Nibco	S211	T211
7.2	Crane	1310	1
8	NOTES		
8.1	Provide manufacturer's standard stem packing for service intended.		
8.2	Valves with rising stems suitable for repacking under pressure.		

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

- 1 Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.
- 2 VALVE DESIGNATION CV-5
- 3 TYPE Globe
- 4 MAXIMUM WORKING
 - 4.1 Pressure - PSIG 125
 - 4.2 Temperature - °F Sat. Stm.
- 5 SIZE LIMITS - Inches 3 - 12
- 6 DESCRIPTION
 - 6.1 Body Iron ASTM A126
 - 6.2 Trim Bronze
 - 6.3 Disc/plug Renewable Composite
 - 6.4 Bonnet Bolted
 - 6.5 Stem OS&Y
 - 6.6 Seat Renewable Rings
 - 6.7 Agency Compliance MSS SP-85
- 7 APPROVED PRODUCTS
 - 7.1 Nibco F-718-B
 - 7.2 Crane 351
 - 7.3 Jenkins 613CJ
- 8 NOTES
 - 8.1 Provide manufacturer's standard stem packing for service intended.
 - 8.2 Valves with rising stems suitable for repacking under pressure.

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

1	Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.			
2	VALVE DESIGNATION	CV-7	CV-8	
3	TYPE	Horizontal Swing Check	Horizontal Swing Check	
4	MAXIMUM WORKING			
4.1	Pressure - PSIG	125	125	
4.2	Temperature - °F	Sat. Stm.	Sat. Stm.	
5	SIZE LIMITS - Inches	0 - 3	2 1/2 - 12	
6	DESCRIPTION			
6.1	Body	Bronze ASTM-B62	Iron ASTM A-126	
6.2	Trim	Bronze	Bronze	
6.3	Disc/plug	Bronze	Renewable Bronze	
6.4	Bonnet	Screw-in	ASTM B-584	
6.5	Seat	Integral	Renewable Rings	
6.6	Agency Compliance	MSS SP-80	MSS SP-71 TYPE I	
7	APPROVED PRODUCTS	Soldered	Threaded	Threaded Flanged
7.1	Crane	1342	37	372 373
7.2	Nibco	S41BB	T-413B	T-918-13 F-918-13
7.3	Jenkins	762A		
7.4	Victaulic	Series 716		Series 779

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

- | | | |
|-----|--|----------------------|
| 1 | Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system. | |
| 2 | VALVE DESIGNATION | CV-10 |
| 3 | TYPE | Lubricated Plug Cock |
| 4 | MAXIMUM WORKING | |
| 4.1 | Pressure - PSIG | 200 |
| 4.2 | Temperature - °F | 150 |
| 5 | SIZE LIMITS - Inches | 1/2 – 2 (Threaded) |
| 6 | DESCRIPTION | |
| 6.1 | Body | Iron |
| 6.2 | Trim | Iron |
| 6.3 | Disc/plug | 100% Pipe Area Plug |
| 6.4 | Seat | Integral |
| 7 | APPROVED PRODUCTS | |
| 7.1 | Nordstrum | 114 |
| 7.2 | Walworth | 1700 |
| 8 | NOTES | |
| 8.1 | Provide manufacturer's standard stem packing for service intended. | |

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

- 1 Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.
- 2 VALVE DESIGNATION CV-16
- 3 TYPE Eccentric Plug
- 4 MAXIMUM WORKING
 - 4.1 Pressure - PSIG 125
 - 4.2 Temperature - °F
- 5 SIZE LIMITS - Inches
 - 1/2 - 2 (Threaded)
 - 2 1/2 - 4 (Flanged)
- 6 DESCRIPTION
 - 6.1 Body Iron
 - 6.2 Trim St. Steel
 - 6.3 Disc/plug Dezurik
Bronze with FS55
(250)
- 7 NOTES
 - 7.1 Provide manufacturer's standard stem packing for service intended.
 - 7.2 Provide lever actuator for each valve except where special actuator is noted on Drawings.
 - 7.3 Where eccentric plug valves are noted on Drawings as balancing valves, they are to have position stop, plastic cap and 1/8" downstream tap.

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

- 1 Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.
- 2 CLASS NO. CV-20
- 3 TYPE Ball - Full Port
- 4 MAXIMUM WORKING
 - 4.1 Pressure - PSIG 600
 - 4.2 Temperature - °F Sat. Stm.
- 5 SIZE LIMITS - Inches 1/2 – 2 1/2"
- 6 DESCRIPTION
 - 6.1 Body/End Piece 2-Piece Construction - ASTM B 584 Bronze Body Alloy 844 Forging Brass ASTM B-124 Alloy 377
 - 6.2 Ball Chromeplated Brass Full Port
 - 6.3 Stem Bronze or Brass
 - 6.3.1 Provide with Stem Extension on insulated pipes
 - 6.4 Seats/Seals Teflon
 - 6.5 Agency Compliance MSS SP-110
- 7 APPROVED PRODUCTS Threaded
 - 7.1 Nibco T-585-70
 - 7.2 Crane/Capri 9202
 - 7.3 Conbraco Industries, Inc. 70-100
Apollo Series
- 8 NOTES
 - 8.1 Soldered valves are not allowed.
 - 8.2 Provide stem extension or valve manufacturers insulated extension handle system on all valves installed in insulated systems and specified to be insulated.
 - 8.3 Provide lead-free valves for all domestic water applications.

PART 2 - PRODUCTS (Continued)

VALVE SCHEDULES

1	Refer to System Schedules in Execution portion of this Section for designation of valve types to be used for each piping system.	
2	CLASS NO.	CV-22
3	TYPE	Ball - Full Port - AGA Gas Ball Valve
4	MAXIMUM WORKING	
4.1	Pressure - PSIG	5 psig Ambient - Valve Rated at 600 psig at 250° F
5	SIZE LIMITS - Inches	1/2 - 2
6	DESCRIPTION	
6.1	Body/End Piece	Cast Brass ASTM B684 - C85700 Forged Brass ASTM B124 - C37700
6.2	Ball	Chromeplated Brass Conventional Port
6.3	Stem	Bronze or Brass
6.4	Seats/Seals	PTFE
6.5	Agency Compliance	
6.5.1	ANSI	Z21.15
6.5.2	FM	1/4" - 2"
6.5.3	UL	MHKZ; YSTD: VOGU (1/2" - 1"); YRBX (1 1/4" - 2"); YRPV (1 1/4" - 2")
7	APPROVED PRODUCTS	Threaded
7.1	McDonald	#10710

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pipe, valves and fittings for each system as designated in the System Schedules on the following pages.
- B. Reference Products, Part 2 of this Section for specifications and manufacturers of pipes, valves and fittings designated to be installed in System Schedules.

PART 3 - EXECUTION (Continued)

**SYSTEM PIPING SCHEDULE 13
COIL CONDENSATE**

- | | | |
|-----|--|---------|
| 1 | Install pipe, valves and fittings as designated in this Schedule for this System. | |
| 2 | NOMINAL SIZE RANGE | |
| 2.1 | Minimum Diameter | 1" |
| 2.2 | Maximum Diameter | 4" |
| 3 | DESIGN | |
| 3.1 | Working Pressure Ft. Hd. | 10 |
| 3.2 | Working Temperature °F | Ambient |
| 4 | PIPING DESIGNATIONS | |
| 4.1 | Hard "L" Copper | CP-8 |
| 4.2 | Sch. 40 PVC | CP-30 |
| 5 | FITTING DESIGNATIONS | |
| 5.1 | Wrought | CF-8 |
| 5.2 | Sch. 40 PVC | CF-30 |
| 6 | JOINT DESIGNATIONS | |
| 6.1 | Solder | CJ-8 |
| 6.2 | Solvent Cement | CJ-33 |
| 7 | NOTES | |
| 7.1 | PVC piping installed above ceilings and within all plenum types shall be insulated. Reference Insulation Section 200180. | |
| 7.2 | All coil condensate piping shall be installed with slope of not less than 1/8" per foot. | |

PART 3 - EXECUTION (Continued)

**SYSTEM PIPING SCHEDULE 14
SANITARY AND VENT -INSIDE BUILDING**

- 1 Install pipe, valves and fittings as designated in this Schedule for this System.
- 2 ABOVE GRADE
 - 2.1 SANITARY & STORM PIPE DESIGNATIONS

SANITARY & STORM PIPE DESIGNATIONS		FITTING DESIGNATIONS		JOINT DESIGNATIONS	
2.1.1 1 1/2" and Larger					
2.1.1.1	Cast Iron No Hub	CP-41	No Hub	CF-41	Coupling CJ-41
2.1.1.2	Sch. 40 DWV PVC	CP-33	PVC	CF-33	Solvent CJ-33
 - 2.2 VENT PIPE DESIGNATIONS

2.2.1 1 1/2" and Larger					
2.2.1.1	Cast Iron No Hub	CP-41	No Hub	CF-41	Coupling CJ-41
2.2.1.2	Sch. 40 DWV PVC	CP-33	PVC	CF-33	Solvent CJ-33
- 3 BELOW FLOOR
 - 3.1 SANITARY, STORM AND VENT
 - 3.1.1 2" and Larger

3.1.1.1	Cast Iron Hub	CP-40	Hub	CF-40	Gasket CJ-40
3.1.1.2	Sch. 40 DWV PVC	CP-33	PVC	CF-33	Solvent CJ-33
- 4 NOTES
 - 4.1 PVC piping installed above ceilings and within all plenum types shall be insulated. Reference Insulation Section 200180.
 - 4.2 All waste pipe below kitchen shall be cast iron below footprint of kitchen.

PART 3 - EXECUTION (Continued)

SYSTEM PIPING SCHEDULE 17
DOMESTIC HOT & COLD WATER
ABOVE GROUND

- | | | |
|-----|---|---------|
| 1 | Install pipe, valves and fittings as designated in this Schedule for this System. | |
| 2 | NOMINAL SIZE RANGE | |
| 2.1 | Minimum Diameter | 1/2" |
| 2.2 | Maximum Diameter | 3" |
| 3 | DESIGN | |
| 3.1 | Working Pressure PSIG | 125 |
| 3.2 | Working Temperature °F | 250 |
| 4 | PIPING DESIGNATIONS | |
| 4.1 | Hard "L" Copper | CP-8 |
| 5 | FITTING DESIGNATIONS | |
| 5.1 | Cold Press | CF-8A |
| 5.2 | Wrought | CF-8 |
| 5.3 | Grooved Mech. | - |
| 6 | JOINT DESIGNATIONS | |
| 6.1 | Cold Press | CJ-8A |
| 6.2 | Solder | CJ-8 |
| 6.3 | Grooved | - |
| 7 | VALVES | |
| 7.1 | Ball | CV-20 |
| 7.2 | Globe | CV-4, 5 |
| 7.3 | Check Horizontal Swing | CV-7, 8 |
| 7.4 | Butterfly | - |
| 8 | NOTES | |
| 8.1 | Install ball valves for balancing services. | |
| 8.2 | Use flange joint on 3" and larger pipe when connection to equipment or valves. | |
| 8.3 | See Division 22 "Plumbing" for special valves. | |

PART 3 - EXECUTION (Continued)

**SYSTEM PIPING SCHEDULE 20
GAS PIPING**

- | | | |
|-----|--|-------|
| 1 | Install pipe, valves and fittings as designated in this Schedule for this System. | |
| 2 | NOMINAL SIZE RANGE | |
| 2.1 | Minimum Diameter | 1/4" |
| 2.2 | Maximum Diameter | 2" |
| 3 | DESIGN | |
| 3.1 | Working Pressure PSIG | 5 |
| 3.2 | Working Temperature °F | 150 |
| 4 | PIPING DESIGNATIONS | |
| 4.1 | Sch. 40 Bl. St. | CP-2 |
| 5 | FITTING DESIGNATIONS | |
| 5.1 | 150# Mal. Iron | CF-1 |
| 5.2 | Wrought St. | - |
| 6 | JOINT DESIGNATIONS | |
| 6.1 | Threaded | CJ-1 |
| 6.2 | Welded | - |
| 7 | VALVE DESIGNATIONS | |
| 7.1 | Cock | CV-10 |
| 7.2 | Eccentric Plug | CV-16 |
| 7.3 | Ball | CV-22 |
| 7.4 | Crane 270 Gas Cock in 1 1/2" and Under | |
| 8 | NOTES | |
| 8.1 | Unions shall be malleable iron railroad unions for 500# WOG. | |
| 8.2 | Pipe buried below ground to be Dupont Aldyl A or approved AGA equal. | |
| 8.3 | Steel piping shall connect to plastic piping just below ground. Coat steel pipe which extends into ground with cold asphalt Reilly Tar & Chemical Enamel CA-50; Glass Fiber and Mat Roskote Glasswrap with coat enamel or approved equal. | |
| 8.4 | Underground piping within building shall be installed in underground conduit, in accordance with National Fire Code 54. Conduit used to encase gas pipe shall be Schedule 40 steel pipe, well wrapped or plastic coated. All joints to be welded. Provide cathode protection for electrolytic action. Conduit shall extend to outside for venting. | |
| 8.5 | Inspection, testing and purging shall be done as set forth in NFPA #53, Part 4. | |

3.2 PIPE SUPPORT

A. PIPE SUPPORT

1. Furnish and install supports, guides, anchors and swaybraces required for proper installation and support of pipe lines except supports noted to be furnished by others.
2. Pipe suspension shall prevent excessive stress and excessive variation in supporting force. Fabrication and installation of supports for pipe lines shall not constrain piping to cause excess transfer of load from supports to piping or from support to support when expansion or contraction occurs. Supports shall be capable of taking entire piping load imposed by expansion or contraction.
3. Where pipe vibration transmits objectionable vibration to building structure or attached equipment, hangers shall be supplemented by spring cushions or an energy absorbing means in the supports themselves, or through the addition of flexible piping connectors or other auxiliary equipment.
4. Piping system where flexibility is not desired shall be supported by rigid hangers.
5. See Section 20 00 10, "Attaching to Building Construction" for attaching pipe support to structure.

B. Vertical Pipe Risers

1. Support vertical runs under 15' long with hanger adjacent to elbows.
2. Support vertical runs over 15' with steel riser clamps. Weld clamps to pipe and support on building structure. Space clamps at every floor with maximum spacing of 28'.

C. Hanger Rods

1. Support horizontal pipe with hot rolled steel rod manufactured in accordance with ASTM A107. Space hanger rods to eliminate pipe sagging. Space hangers as listed below. Place hangers within 12" of each horizontal elbow.
2. Steel and Copper Hanger Spacing

<u>PIPE SIZE (NPS)</u>	<u>ROD SIZE (DIAMETER)</u>	<u>MAXIMUM HANGER SPACING</u>
1/2" thru 1-1/4"	3/8"	6'0"
1-1/2" and 3"	1/2"	10'0"
4" and 5"	5/8"	10'0"
6"	3/4"	10'0"
8" thru 12"	7/8"	15'0"
14" thru 18"	Two 7/8"	15'0"
20" thru 24"	Two 1"	15'0"

3. PVC Pipe Support Spacing

<u>PIPE SIZE (NPS)</u>	<u>ROD SIZE (DIAMETER)</u>	<u>MAXIMUM HANGER SPACING</u>
1/2" thru 1"	3/8"	3'0"
1-1/4" thru 3"	3/8"	4'0"
4" thru 5"	1/2"	4'0"
6"	1/2"	4'0"

4. Piping with caulked joints to be supported at each joint.
- D. Pipe Hangers (Pipe Suspended from Above)
1. For Hot Lines or Combination Hot and Cold Lines
 - a. 2" and smaller iron or steel pipe: adjustable steel clevis hangers. Elcen 12; Grinnell 260; Fee & Mason 239; Crawford 11.
 - b. 2" and smaller copper pipe: adjustable copper pipe ring. Elcen 394; Grinnell 97CP; Fee & Mason 365; Crawford.
 - c. 2-1/2" thru 12" iron, steel and copper pipe: adjustable steel clevis hangers. Elcen 12; Grinnell 260; Fee & Mason 239; Crawford 11.
 - d. 2-1/2" thru 12" iron, steel and copper pipe: adjustable swivel pipe roll (one hanger rod). Elcen 14; Grinnell 174; Fee & Mason 272; Crawford 129.
 - e. 14" thru 24" o.d. iron or steel pipe: single pipe roll with adjustable sockets (two hanger rods). Elcen 15; Grinnell 171; Fee & Mason 170; Crawford 15.
 2. For Cold Lines
 - a. All sizes iron or steel pipe: Elcen 12; Grinnell 260; Fee & Mason 239; Crawford 11.
 - b. All sizes copper pipe: adjustable copper-plated ring. Elcen 394; Grinnell 97CP; Fee & Mason 365; Crawford.
 3. All hangers used on lines requiring insulation and vapor barrier shall have hangers oversized to allow insulation to pass thru hanger. Install insulation cradles or wood blocks the same thickness as insulation so insulation will not be crushed. Insulation cradles or wood blocks shall be designed for this specific use.
- E. Pipe Carriers (Pipe Supported from Below on Racks, Piers, Stands or Trapeze Support)
1. For Hot Lines or Combination Hot and Cold Lines
 - a. 3" and smaller Pipe: roller chair with steel U bar support. Elcen 16; Grinnell 176; Fee & Mason 168; Crawford 130.
 - b. 4" and larger Pipe: adjustable pipe roll stand with base plate. Elcen 20; Grinnell 274; Fee & Mason 161; Crawford 19.
 2. For Cold Lines: all pipe sizes supported on steel pipe chair designed to contain pipe movement in direction perpendicular to pipe run but allow some movement in direction of pipe run.
 3. All hangers used on lines requiring insulation and vapor barrier shall have hangers oversized to allow insulation to pass thru hanger. Install insulation cradles or wood blocks the same thickness as insulation so insulation will not be crushed. Insulation cradles or wood blocks shall be designed for this specific use.
- F. For sprinkler piping support refer to NFPA#13 (3-10 hangers).
- G. Supports for sprinkler piping to be in conformance with NFPA 13, if modified by this section.
- H. For piping hanger rod attachment to building, see Section 20 00 10 "Attaching to Building Construction."

3.3 UNDERGROUND PIPING Reference - Excavation and Backfilling

- A. See Excavation and Backfilling Section 200050.

3.4 ESCUTCHEONS

- A. See Escutcheons, Section 200050.

3.5 INSTALLATION OF VALVES

- A. Locate valves accessibly and arrange to permit easy removal of fixtures and equipment they serve.
- B. Unless otherwise noted, all valves shall be full size of lines in which they are placed.
- C. Install all piping and shut-off valves full pipe size as shown on Drawings. Reduce at control valves to control valve size.
- D. Valves mounted in horizontal lines shall not have their stems and bonnets pointed below horizontal position unless indicated on Drawings.
- E. Provide valves with 3/4" garden hose adaptor for draining low points, boilers, chillers, coils, etc. with cap and chain. Use ball valves for systems which operate below 120°F. Use gate (Crane 431) or globe valves for systems which operate above 121°F.
- F. Mount all globe valves to close against flow pressure. Flow should be against bottom of plug.
- G. Remove bonnets and trim from all valves before soldering, brazing or welding in piping system. Protect seating surfaces during installation. Clean valve parts thoroughly before reassembling. Install bonnet with valve in open position. Follow manufacturers written instructions to protect valves from overheating during installation.
- H. Install all valves with discs or plugs in open position. Close only when assured that sealing parts are free from foreign material. Weld scale or similar foreign materials found embedded in sealing surfaces will require installation of new trim or complete valve.
- I. If grooved piping system is used, then only grooved end valves shall be used. **If grooved piping is used, it is not acceptable to use grooved to flanged adapters to install flanged valves.**
- J. Install valves as required by control contractor.

3.6 INSTALLATION OF PIPING

- A. Offset piping to avoid interference with other work to increase head room under piping.
- B. Contractor may, at his option, use pipe bending equipment to form full lengths of pipe to proper configuration indicated on Drawings.
- C. Remove raised face from flanges that are to match cast iron flat face patterns.

- D. Coat studs, nuts, flange faces and metallic gaskets with material similar to molybdenum disulphide before assembly.
- E. Pipe sizes refer to nominal inside pipe diameter except on copper refrigeration lines and steel and wrought iron pipe 14" and larger.
- F. Bonney Weldolet Forge Branch Outlet Fittings may be used where steel with welding fittings are specified in lieu of branch outlet tees, provided branch tee is 2 sizes smaller than main. Nipples welded into mains not acceptable.
- G. Use galvanized fittings and unions with galvanized pipe.
- H. Caulk clearance space in floor sleeves with plastic compound or fire stop material as required.
- I. Caulk exterior wall sleeves with thiokol.
- J. Install chromeplated pipe escutcheons on bare exposed pipe at wall, floor and ceiling penetrations. Reference 200050 Escutcheons.
- K. Use dielectric couplings when joining dissimilar piping materials.
- L. Piping shall not pass over electrical apparatus. If conflict is shown on Drawings, notify Engineer prior to installing pipe.
- M. Refer to General Requirements for installation of sleeves, escutcheons, cutting and fitting and attaching to building construction.
- N. Refer to Insulation Section 200180 for insulation data. PVC piping installed above ceilings and within all plenum types shall be insulated.
- O. Conceal all pipes where provisions have been made for this purpose.
- P. In case of conflict on Drawings as to pipe size, the larger pipe size shall be installed.
- Q. Joints shall be approved type, gas and watertight for system pressure.
- R. All pipes shall be cut square, reamed, chamfered and free of all burrs and obstructions. Pipe ends shall have full-bore openings and not be undercut.
- S. Piping not serving elevator equipment rooms shall not pass through elevator equipment rooms. If conflict is shown on drawings, notify Engineer prior to installing pipe.
- T. Install wells, thread-o-lets and T's as required by control contractor.
- U. Copper pipe shall not come in direct contact with mortar or grout. Where copper pipes are exposed to mortar or grout, pipes shall be wrapped with duct tape. This typically happens when pipes pass through masonry walls.
- V. All pipes to equipment and isolation valves shall be full pipe size as shown on Drawings regardless of equipment connection size. Use reducers at equipment to reduce to equipment size.

- W. Grooved product must be installed per manufacturer's written instructions, which may or may not include extreme lubricant, torque wrench and specified torque ratings. Manufacturer's representative must provide on-site training to field personnel on installation of product.
- X. No pulled "T" drilling of copper piping for branch takeoff's allowed.
- Y. Condensate piping shall be installed with slope of not less than 1/8" per foot.

3.7 PIPE CLEANING

- A. Swab to remove dirt or scale.
- B. Flush water system until water runs clear.
- C. Operate steam systems until condensate runs clear.
- D. Clean all strainers and traps.

3.8 TESTING PIPING

- A. Test all piping at 1 1/2 times operating pressure.
- B. Test all concealed work before covering with earth, insulation or furring.
- C. Notify Engineer not less than 24 hours in advance of all tests.
- D. Furnish all fuel and necessary equipment required for tests.
- E. Promptly repair all leaks and reapply tests.
- F. Install blind flanges or plugs in order to make tests.
- G. See Specification Divisions 22 and 23 for additional pressure testing requirements.

3.9 STERILIZATION OF DOMESTIC WATER SYSTEM

- A. Flush system thoroughly until water runs clear.
- B. Entire system shall be filled with a water/chlorine solution containing 50 parts per million of chlorine. The system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million of chlorine and allowed to stand for three hours.
- C. Following the allowed standing time, the system shall be flushed with clean potable water until chlorine does not remain in the water coming from the system.
- D. After the above requirements are satisfied, submit samples to local Board of Health for approval.
- E. Sterilization shall be redone until approval from the State Board of Health is obtained.

3.10 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook", using lead-free solder alloy complying with ASTM C 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook", "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4. PVC Non-pressure Piping: Join according to ASTM D 2855.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.11 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
 - 5. "Pulled Tee's" in copper piping are not allowed.

3.12 GROOVED PIPING

- A. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks. Gaskets shall be molded and produced by the coupling manufacturer and shall be verified as suitable for the intended service. A factory-trained field representative (direct employee) of the mechanical joint manufacture shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. The factory-trained representative shall periodically review the product installation and ensure best practices are being followed. Contractor shall remove and replace any improperly installed products. A distributor's representative is not considered qualified to conduct the training.
- B. For applicable projects, the grooved coupling manufacturer shall provide inspection services and/or certify the installing contractor for the installation of their product. The manufacturer's factory trained representative shall provide certification training for the installing contractor's field personnel in the use of grooving tools, application of groove, and product installation. The training program shall be designed, developed, administered and evaluated in accordance to the ANSI/IACET Standard for Continuing Education and Training. (IACET-International Association for Continuing Education and Training)

END OF SECTION 200060

SECTION 200180 – COMMON INSULATION FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes field applied insulation and jacket materials for all systems. These systems include:
 - 1. System Insulation Schedule 3:
 - Coil Condensate Pipe
 - Domestic Cold Water Pipe
 - Domestic Hot Water Pipe
 - Sanitary Waste & Vent
 - 2. System Insulation Schedule 9:
 - Heating and Air Conditioning:
 - Supply Air Ductwork
 - 3. System Insulation Schedule 10:
 - Return Air Ductwork
- B. Any equipment that is to be factory insulated is specified with respective equipment.
- C. All PVC piping installed (or existing to remain) in a ceiling plenum shall be insulated to provide a flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
- D. Any piece of equipment, pipe, or duct, installed in this contract, which is typically insulated to prevent condensation, shall be insulated unless specifically noted otherwise.
- E. Internally lined sheet metal is specified in Metal Ducts, Section 233113.
- F. Related sections include all applicable Mechanical Sections.

1.3 SUBMITTALS

- A. Submit product data for insulation, jacket materials and fittings used in each system as required in Section 200010, "Shop Drawings".
- B. Product data shall include thermal conductivity, thickness, jacket material, insulation material, sealing compounds, flame-spread and smoke-developed ratings for each type of product to be used.
- C. Submit test reports of independent testing agency showing conformance with flame-spread and smoke-developed ratings.

1.4 QUALITY ASSURANCE

- A. Insulation Contractor shall have completed a minimum of two (2) projects of similar scope. Upon request, the Insulation Contractor shall provide a list of similar projects and references to the Engineer. The engineer may wish to inspect work previously installed by the Insulation Contractor.
- B. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
- C. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. All insulation to be shipped to site in unopened containers as packaged by Insulation Manufacturers.
- B. All containers shall state contents within.
- C. Store in clean dry area properly protected from weather and physical damage.
- D. Open only containers required to be opened as construction progresses.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers and insulation shields.
- B. Coordinate hanger sizes and piping penetrations for pipes requiring insulation, wood blocking and saddles with piping installer.

1.7 SCHEDULING

- A. Schedule insulation application after pipe testing and heat trace has been installed.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Refer to Insulation Material Schedules in Execution portion of this Section for Insulation types to be used for each system. When more than one is shown, contractor may choose which type is to be installed.
- B. Fiberglass Insulation
 - 1. Glass fiber bonded with a thermosetting resin with thermal conductivity of .27 or less @ 75°F. 3-pound per cubic foot density. Designed for use to 650°F.
 - a. Preformed Pipe Insulation with Jacket: ASTM C547, Type 1, Class 1 with factory applied all-purpose, vapor-retarder jacket, 0.02 perm max water vapor permeance.
 - b. Board Insulation: with ASTM C 612, Type IB, without facing and with FSK jacket manufactured from kraft paper, reinforcing scrim, aluminum foil and vinyl film. Verify

- jacketing with Engineer prior to insulating exposed ductwork with board insulation within finished spaces.
- c. Blanket Insulation: ASTM C 553, Type II, without facing and with FSK manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
2. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to un-faced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to un-faced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 3. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 4. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
 5. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
 6. Mineral-Fiber, hydraulic-setting insulating and finishing cement: Comply with ASTM C 449/C 449M.
 7. Manufacturers:
 - a. CertainTeed Manson
 - b. Knauf Insulation.
 - c. Owens-Corning Fiberglas Corp.
 - d. Schuller International, Inc.
 - e. Johns Manville
- C. Flexible Elastomeric Insulation
1. Closed cellular or expanded rubber material of high insulating efficiency (K of .25 or better @ 75°F) and designed for use with temperatures from -40° to 210°F. Odorless, self-extinguishing and vapor resistant in compliance with ASTM E-84, 25/50 flame smoke rating. Approved for use in return air plenums.
 - a. Preformed pipe insulation: ASTM C 534, Type I.
 - b. Sheet insulation: ASTM C 534, Type II.
 2. Adhesive: As recommended by Insulation Material Manufacturer.
 3. Ultraviolet – Protective Coating: As recommended by Insulation Manufacturer.
 4. Manufacturers:
 - a. Armacell AP
 - b. K-Flex
 - c. Aeroflex
- D. Flexible Epdm Rubber Sheet
1. Flexible closed cell, lightweight elastomeric EPDM material with Ultraviolet resistance and insulating qualities for use outdoors.
 2. Technical Data

Property	Test Method	Result
Thickness	-	1 ½".
Thermal Conductivity	ASTM C177/C518	0.245 k-value

Service Temperature	ASTM C 411	-297 F to +300 F
Surface Burning Characteristics	ASTM D 635 ASTM E 84	Self-Extinguishing Flame 25, Smoke 50
Water Absorption	ASTM C 209	0.2% max
Vapor Permeance	ASTM E 96	.03 perms
UV Resistance	ASTM G 7/G90	Excellent
Ozone Resistance	ASTM D 1171	No Cracking
Water Vapor Sorption	ASTM C 1104	0.00 %
Fungi Resistance	ASTM C 1338/ G21 /UL181	No Growth
Dimensional Stability	ASTM C 356	7 % max

3. Manufacturers:
 - a. Aeroflex USA, Inc. – Aerocell.

2.2 ADHESIVES

- A. Adhesives or mastics used in the application or manufacture of insulating materials shall be fire retardant with UL flame rating not exceeding 25 and smoke developed rating not exceeding 50 (on dry film) when tested in accordance with ASTM E 84. All adhesives specifically designed for respective application as noted by insulation manufacturer.

2.3 JACKETS

- A. PVC Jacket
 1. High-impact
 - a. Fittings – Gloss White, preformed, 30 Mill, PVC jacket designed for use with and provided by same manufacturer of insulation. Fiberglass insert wrapped around fitting and covered by PVC preformed jacket piping insulation system.
 - b. Sheet – Gloss White, preformed, pre-cut and curled 20 mil PVC jacket designed for use with and provided by same manufacturer of piping insulation system. Ultraviolet-resistant suitable for outdoor service and temperature range 0 – 150°F. Jacket to be completely sealed with solvent weld for vapor proof barrier where noted in schedule.
- B. Foil and Paper Jacket
 1. Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil. Maximum of .02 perms moisture vapor transmission, ASTM C 921, Type I, Max 25/50 flame smoke rating.
- C. Aluminum Jacket
 1. Aluminum roll stock .020" thick, ready for shop or field cutting and forming. ASTM B209, 3003 alloy, H-14 temper.
 2. Aluminum Fittings - Preformed - same thickness and finish as jacket.
 3. Jacket Bands - Aluminum 3/4" wide.
- D. Stainless Steel Jacket

1. Stainless steel roll stock .020" thick, ready for shop or field cutting and forming. ASTM A66, Type 304 or 316.
2. Stainless steel fittings - Gore Type, same thickness and finish as jacket.
3. Jacket Bands - Stainless steel, Type 304, 3/4" wide.

E. Multilayer Weatherproof Jacket:

1. Pre-fabricated self-adhering, sheet-type protective membrane. The outer (exposed) layer shall be an embossed, UV-resistant aluminum weathering surface. Under the aluminum shall be multiple layers of tough, high-density cross-linked polymer film. Under the polymer film shall be a uniform layer of aggressive rubberized asphalt adhesive which sticks directly to metal, insulation facers and most other clean, dry surfaces. The self-adhesive surface shall be protected by a disposable release liner. Exterior layer shall be brown in color.

2. Technical Data

Property	Test Method	Result
Material Thickness	ASTM D 1970	25 Mils Nom.
Flexibility @ -20°F	ASTM D 1970	Pass
Vapor Permeance	ASTM E 96	.01 perms
Nail Sealability	ASTM D 1970	Pass
Heat Aging	ASTM D 794	Pass
Ultimate Elongation MD	ASTM D 412	434%
Ultimate Elongation CMD	ASTM D 412	246%

2.4 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape

1. Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. yd. (270 g/sq. m). Tape Width: 4 inches (100 mm).

B. Bands

1. 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:
 - a. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
 - b. Aluminum: 0.007 inch (0.18 mm) thick.

C. Wire

1. 0.080-inch (2.0 mm), nickel-copper alloy; 0.062-inch (1.6 mm), soft-annealed, stainless steel; or 0.062-inch (1.6 mm), soft-annealed, galvanized steel.

D. Welded-Attached Anchor Pins and Washers

1. Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
 - a. Welded Pin Holding Capacity: 100 lb. (45 kg) for direct pull perpendicular to the attached surface.

E. Adhesive-Attached Anchor Pins and Speed Washers

1. Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.
 - a. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperature of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb. (45 kg) for direct pull perpendicular to the adhered surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Insulation for each system as designated in the Insulation Material Schedules on the following pages.
- B. When more than one type of insulation system is specified, contractor may choose which type is installed.
- C. Reference Products, Part 2 of this Section for specifications and manufacturers of insulation materials designated to be installed in Insulation Material Schedules.

3.0 EXECUTION (Continued)

SYSTEM INSULATION SCHEDULE 3:
COIL CONDENSATE PIPE
DOMESTIC COLD WATER PIPE
DOMESTIC HOT WATER PIPE
SANITARY WASTE & VENT

- | | | |
|-------|--|----------------------------------|
| 1 | Install insulation materials as designated in this schedule for system(s) listed. | |
| 2 | LOCATION | INSIDE |
| 3 | INSULATION | |
| 3.1 | Pipe | Fiberglass-Preformed with Jacket |
| 3.2 | Fitting | Fiberglass Blanket |
| 4 | INSULATION THICKNESS | |
| 4.1 | Pipe Size | All |
| 4.2 | Thickness | 1" |
| 5 | JACKETS | |
| 5.1 | Pipe | Integral to Insulation |
| 5.2 | Fittings | Preformed PVC |
| 5.3 | Vapor-Retardant | Yes |
| 6 | NOTES | |
| 6.1 | Application of insulation on sanitary waste pipe shall be as follows: | |
| 6.1.1 | Piping installed above ground floor. | |
| 6.1.2 | Serving discharge from cooling coils or electric water coolers. | |
| 6.1.3 | Piping installed in return air plenum. | |
| 6.1.4 | Where insulation is required, install along pipe lengths connecting fixture to waste stack/main building drain only. | |

3.1 EXECUTION (Continued)

SYSTEM INSULATION SCHEDULE 9:
HEATING AND AIR CONDITIONING:
SUPPLY AIR DUCTWORK

1	Install insulation materials as designated in this schedule for system.				
2	LOCATION	INSIDE	INSIDE	INSIDE	EXTERIOR
3	INSULATION MATERIAL	3/4 lb. Flexible Fiberglass	3 lb. Rigid Fiberglass	Flexible Elastomeric	Flexible EPDM Rubber
4	INSULATION THICKNESS	1 1/2"	1 1/2"	3/4"	2"
5	JACKETS	FSK	FSK	FSK	Multi-Layer Weatherproof
5.1	Vapor-Retardant	Yes	Yes	Yes	Yes
6	NOTES				
6.1	Use rigid or flexible elastomeric insulation in mechanical rooms. All other areas may be flexible fiberglass.				
6.2	Where smaller diameter round ductwork is to be insulated and then painted, utilize pre-formed pipe insulation of required thickness with paper jacketing.				
6.3	Insulate ends of reheat coils including VAV box reheat coils in all applications where heating coils are in air conditioning supply ductwork. Install vapor barrier over insulation and seal watertight to adjacent insulation vapor barrier.				
6.4	Externally insulate supply air slot diffuser plenums with flexible fiberglass.				
6.5	External insulation to have a 1" crown on top to shed water.				
6.6	Where supply and return air branch ducts containing volume dampers are covered using duct wrap, expose volume damper actuator through duct wrap and "spot" paint the duct wrap around the actuator a bright and contrasting color for ease in visually locating the actuator while standing on the floor below the duct.				

3.1 EXECUTION (Continued)

SYSTEM INSULATION SCHEDULE 10:
HEATING AND AIR CONDITIONING:
RETURN AIR DUCTWORK

- | | | | |
|-----|---|--------------------|------------------|
| 1 | Install insulation materials as designated in this schedule for this system. | | |
| 2 | LOCATION | SEE NOTES | SEE NOTES |
| 3 | INSULATION MATERIAL | 3/4 lb. Fiberglass | 3 lb. Fiberglass |
| 4 | INSULATION THICKNESS | 1 1/2" | 1 1/2" |
| 5 | JACKETS | FSK | FSK |
| 5.1 | Vapor-Retardant | No | No |
| 6 | NOTES | | |
| 6.1 | Insulate return air ductwork in unconditioned attics and unconditioned machine rooms. Return air ductwork in unconditioned attics shall have 2" insulation thickness. | | |
| 6.2 | Insulate return air ductwork in unconditioned attics and unconditioned machine rooms. | | |

3.2 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.4 GENERAL APPLICATION REQUIREMENTS

- A. All insulation that is to be painted shall be covered with glass cloth jacket unless noted otherwise.
- B. Apply insulation only after pipes, ducts and equipment have been tested and cleaned.
- C. Protect furniture, equipment, ducts, pipes, etc. with tarpaulins. Keep premises clean.
- D. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the entire length.
- E. Refer to schedules at the beginning of this Section for insulation materials and thickness, jackets, and fittings required for each system. Unless otherwise indicated, insulation shall be the same type throughout the same service.
- F. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- G. Where insulation is applied on ducts, pipes and equipment which are against columns, walls or other equipment without adequate space for insulation, finish off insulation in workmanlike manner to meet approval of Engineer.
- H. Apply multiple layers of insulation with longitudinal and end seams staggered.
- I. Seal joints, seams and ends of insulation with vapor-retardant mastic on insulation with a compound recommended by the insulation material manufacturer on systems indicated to receive a vapor retardant.
- J. Keep insulation materials dry during application and finishing.
- K. Insulation shall be applied by craftsmen who are qualified to install insulation.
- L. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- M. Apply insulation with the least number of joints practical.
- N. Apply insulation over fittings and specialties, with continuous thermal and vapor-retardant integrity, on systems noted to have vapor-retardant jacket.

- O. Provide removable sections of insulation or insulation boxes at all points where access is required for servicing of equipment on systems not requiring vapor-retardant jacket.
- P. Exposed is defined to mean visible from working zones of finished building. Concealed signifies opposite. Pipes and ducts above ceilings and in crawl tunnels are considered to be concealed. Finished rooms are defined as office, workrooms, instruction, store room areas, equipment rooms, walking tunnels, etc.
- Q. Aluminum jackets shall be installed in high traffic areas subject to damage.
- R. On systems not requiring vapor-retardant, neatly bevel insulation at all flanges, access cover plates, etc. so that bolts may be removed without disturbing insulation.
- S. All hangers used on lines requiring insulation and vapor barrier shall have hangers oversized and insulation cradles to allow insulation to pass thru hanger.
- T. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.
- U. Whenever Insulation Jacket is noted as Vapor Retardant: Overlap insulation facing at seams a minimum of one inch and secure with pressure-sensitive tape or adhesive as recommended by Manufacturer.
- V. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
- W. Seal penetrations with vapor-retardant mastic.
- X. Apply insulation for exterior applications tightly joined to interior insulation ends.
- Y. Seal insulation to roof flashing with vapor-retardant mastic.
- Z. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions.
- AA. Insulation Terminations: For insulation application where vapor retardants are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retardant.
- BB. Do not insulate over equipment name plate data.
- CC. Seal all punctures in vapor retardant jacket with vapor-barrier adhesive on cooling piping and air conditioning ducts.
- DD. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- EE. Do not weld brackets, clips, or other attachment devices to item being insulated unless specifically noted to do so.

3.5 DUCTWORK AND EQUIPMENT INSULATION

- A. Blanket Insulation Application
 - 1. Apply insulation with integral jackets as follows:
 - a. Pull jacket tight and smooth.

- b. Install anchor pins and speed washers to keep insulation from sagging when duct width exceeds 22”.
 - c. Joints and Seams: Cover with tape and vapor retardant as recommended by insulation material manufacturer to maintain vapor seal.
 - d. Vapor-Retardant Mastics: Where vapor retardants are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
 2. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire-rated wall and partition penetrations. Maintain vapor-retardant barrier.
 3. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor. Provide vapor-retardant mastic on insulation indicated to receive vapor-retardant.
- B. Board and Block Insulation Application
 1. Blankets, Board, and Block Applications: Secure insulation with adhesive and anchor pins with speed washers.
 - a. Apply adhesives according to manufacturer’s recommended coverage rates per square foot, for 100 percent coverage of surfaces to be insulated.
 - b. Groove and score insulation materials to fit as closely as possible to the surfaces, including contours. Bevel insulation edges for cylindrical surfaces for tight joint. Stagger end joints.
 - c. Protect exposed corners with secured corner angles.
 - d. Install adhesive-attached or self-adhesive anchor pins and speed washers on sides and bottoms of surfaces to be insulated as follows:
 - 1) Do not weld anchor pins to ASME-labeled pressure vessels.
 - 2) 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c. in both directions.
 - 3) Do not over-compress insulation during installation.
 - 4) Cut and miter insulation segments to fit curved sided and dome heads of tanks and vessels.
 2. Impale insulation over anchor pins and attach speed washers.
 3. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. Secure each layer of insulation with stainless-steel bands.
 5. Stagger joints between insulation layers at least 3 inches (75 mm).
 6. Apply insulation in removable segments on access doors and other elements that require removal for service.
 7. Bevel and seal insulation ends around access panels, manholes, hand holes, ASME stamps, and nameplates.
 8. Apply vapor-retardant mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retardant.
- C. Flexible Elastomeric Thermal Insulation Applications:
 1. Apply insulation over entire surface to be insulated according to the manufacturer’s written instructions.
 2. Apply 100 percent coverage of adhesive to surface with manufacturer’s recommended adhesive.
 3. Seal longitudinal seams and end joints for Vapor Retardant installation.

3.6 FIELD-APPLIED JACKET APPLICATION

- A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.
 - 1. Apply jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
 - 2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of jacket manufacturer's recommended adhesive.
 - 3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.

3.7 PIPING APPLICATION REQUIREMENTS

- A. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Circumferential Joints: Cover with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100mm) o.c.
 - 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retardant.
 - 4. Vapor-Retardant Mastics: Where vapor retardants are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 - 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retardant mastic.
- B. Apply insulation to fittings and elbows as follows:
 - 1. Apply pre-molded insulation sections of the same material as straight segments of pipe insulation where scheduled. Secure according to manufacturer's written instructions.
 - 2. Apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
 - 3. Apply jacket material overlapping seams at least 1 inch (25 mm) at each end. Secure with manufacturer's recommended adhesive, attachments and accessories. Seal seams with tape. Use vapor-retardant mastic on insulation indicated to receive vapor-retardant.
- C. Apply insulation to valves and specialties as follows:
 - 1. Apply pre-molded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - 2. When pre-molded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For strainers, arrange insulation for access to strainer basket without disturbing insulation.
 - 3. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape. Also, seal seams with vapor-retardant mastic on insulation indicated to receive vapor-retardant.
 - 4. On piping 3" and smaller, not requiring vapor-retardant, fittings may be insulated with insulating cement equal in thickness to adjoining pipe insulation and troweled to smooth even finish. Do not insulate heating water pipe valves or unions.

5. For larger sizes where PVC fitting covers are not available, seal insulation with canvas jacket and sealing compound recommended by the insulation material manufacturer.
- D. Floor Penetrations: Apply insulation continuously through floor assembly. Seal insulation with vapor-retardant mastic where floor supports penetrate vapor-retardant.
- E. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retardant mastic.
- F. Hangers and Anchors: All hangers used on lines requiring insulation shall have hangers oversized and insulation support shield to allow insulation to pass continuously thru hanger.
 1. Install insert materials on all piping 1 1/2" and larger. Apply insulation to tightly joint the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 2. Fabricate inserts of heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths:

1 1/2" to 2 1/2" pipe size	10" long
3" to 6" pipe size	12" long
8" to 10" pipe size	16" long
12" and over	22" long
 3. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- G. Apply insulation to flanges as follows:
 1. Apply preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 4. Apply jacket material with manufacturer's recommended adhesive, overlapping seams at least 2 inch (50 mm), and seal joints with vapor-retardant mastic.

END OF SECTION 200180

SECTION 221319 – SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Cleanouts.
 - 2. Floor Drains.
 - 3. Floor Sinks

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Cleanouts for Vinyl Tile Floor:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4141S or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M.
 - 3. Size: Same as connected branch.
 - 4. Body or Ferrule: Cast iron
 - 5. Outlet Connection: Spigot.
 - 6. Closure: Bronze plug with straight threads and gasket.
 - 7. Adjustable Housing Material: Cast iron with threads.
 - 8. Frame and Cover Material and Finish: Nickel-bronze with 1/8-inch tile recess.
 - 9. Frame and Cover Shape: Round.
 - 10. Top Loading Classification: Light duty.

B. Cleanouts for Terrazzo Floor:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4181S or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron
5. Outlet Connection: Spigot.
6. Closure: Bronze plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron with threads.
8. Frame and Cover Material and Finish: Nickel-bronze with 1/2-inch terrazzo recess.
9. Frame and Cover Shape: Round.
10. Top Loading Classification: Light duty.

C. Cleanouts for Carpet Floor:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4021S-Y or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron
5. Outlet Connection: Spigot.
6. Closure: Bronze plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron with threads.
8. Frame and Cover Material and Finish: Scoriated nickel-bronze with carpet marker.
9. Frame and Cover Shape: Round.
10. Top Loading Classification: Light duty.

D. Cleanouts for Concrete Floor:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4101S or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron
5. Outlet Connection: Spigot.
6. Closure: Bronze plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron with setscrews.
8. Frame and Cover Material and Finish: Scoriated nickel-bronze.
9. Frame and Cover Shape: Round.
10. Top Loading Classification: Extra heavy duty.

E. Exterior Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4251S or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron cleanout and cast iron double flanged housing.
5. Outlet Connection: Spigot.
6. Closure: Bronze plug with straight threads and gasket.
7. Frame and Cover Material and Finish: Scoriated cast iron with lifting device.
8. Frame and Cover Shape: Round.
9. Top Loading Classification: Heavy duty.

F. Wall Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 4531S-Y or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M.
3. Size: Same as connected drainage piping.
4. Body: Hub-less, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk, drilled-and-threaded bronze plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains; FD-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 2005Y-A or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Light Commercial Operation.
 2. Standard: ASME A112.6.3.
 3. Pattern: Floor drain.
 4. Body Material: Gray iron.
 5. Seepage Flange: Combination flashing collar and clamp with seepage openings.
 6. Outlet: Bottom, no-hub.
 7. Coating on Interior and Exposed Exterior Surfaces: Not required.
 8. Sediment Bucket: Not required.
 9. Top or Strainer Material: Nickel bronze.
 10. Top Description: Adjustable, round, heel-proof, flat.
 11. Top Loading Classification: Light Duty.
- B. Floor Sink; FS-1:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 3120Y-12 or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Light Commercial Operation.
 2. Standard: ASME A112.6.3.
 3. Pattern: 8-inch-deep floor sink.
 4. Body Material: Gray iron.
 5. Seepage Flange: Flanged receptor with seepage openings.
 6. Outlet: Bottom, no-hub.
 7. Coating on Interior and Exposed Exterior Surfaces: Acid resistant coating.
 8. Sediment Bucket: Bottom dome strainer.
 9. Top or Strainer Material: Nickel bronze.
 10. Top Description: 1/2 grate with nickel bronze rim.
 11. Top Loading Classification: Light duty.
- C. Floor Sink; FS-2:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Jay R. Smith 3110Y-12 or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group; Light Commercial Operation.

2. Standard: ASME A112.6.3.
3. Pattern: 6-inch-deep floor sink.
4. Body Material: Gray iron.
5. Seepage Flange: Flanged receptor with seepage openings.
6. Outlet: Bottom, no-hub.
7. Coating on Interior and Exposed Exterior Surfaces: Acid resistant coating.
8. Sediment Bucket: Bottom dome strainer.
9. Top or Strainer Material: Nickel bronze.
10. Top Description: 1/2 grate with nickel bronze rim.
11. Top Loading Classification: Light duty.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 20 Section "Pipe, Valves, Fittings, and Hangers for Fire Suppression, Plumbing, and HVAC" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 1. Position floor drains for easy access and maintenance.
 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Assemble open drain fittings and install with top of hub 2 inches above floor.

- G. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- H. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- I. Install vent caps on each vent pipe passing through roof.
- J. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 224000 – PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Toilet seats.
 - 2. Protective shielding guards.
 - 3. Water closets.
 - 4. Lavatories.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with the latest adopted version of NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - 2. Vitreous-China Fixtures: ASME A112.19.2M.
 - 3. Water-Closet, Flush Valve Trim: ASME A112.19.5.
- G. Comply with the following applicable standards and other requirements specified for lavatory/sink faucets:
 - 1. Faucets: ASME A112.18.1.

- H. Comply with the following applicable standards and other requirements specified for bathtub/shower faucets:
 - 1. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
 - 2. Faucets: ASME A112.18.1.
 - 3. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
 - 4. Manual-Control Antiscald Faucets: ASTM F 444.
 - 5. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - 1. Brass and Copper Supplies: ASME A112.18.1.
 - 2. Brass Waste Fittings: ASME A112.18.2.
 - 3. Manual-Operation Flushometers: ASSE 1037.
 - 4. Plastic Tubular Fittings: ASTM F 409.
 - 5. Supply Fittings: ASME A112.18.1.
- J. Comply with the following applicable standards and other requirements specified for miscellaneous components
 - 1. Flexible Water Connectors: ASME A112.18.6.
 - 2. Grab Bars: ASTM F 446.
 - 3. Hose-Coupling Threads: ASME B1.20.7.
 - 4. Off-Floor Fixture Supports: ASME A112.6.1M.
 - 5. Pipe Threads: ASME B1.20.1.
 - 6. Plastic Toilet Seats: ANSI Z124.5.
 - 7. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 FLUSH VALVE WATER CLOSETS

- A. Water Closets; WC-1:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide American Standard "Madera FloWise 16-1/2" 3043.001 or a comparable product by one of the following:
 - a. Kohler Co.
 - b. Sloan.
 - c. Zurn Plumbing Products Group.
 - 2. Description: Floor-mounting, bottom-outlet, vitreous-china fixture designed for flushometer valve operation.
 - a. Style: Flushometer valve.
 - b. Bowl Type: Elongated with siphon-jet design.
 - c. Height: 16-1/2" to rim.
 - d. Design Consumption: 1.28 gal./flush.
 - e. Color: White.

2.2 WATER CLOSET FLUSHOMETERS

A. Water Closet; WC-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sloan 111-1.28-DFB or a comparable product by one of the following:
 - a. Zurn Plumbing Products Group; Commercial Brass Operation.
2. Description: Flushometer for water-closet type fixture. Include brass body with corrosion and chlorine resistant internal components, dual-filtered bypass, synthetic rubber diaphragm assembly, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm operation.
 - b. Style: Exposed.
 - c. Inlet Size: NPS 1.
 - d. Trip Mechanism: Oscillating, lever-handle actuator.
 - e. Consumption: 1.28 gal/flush.
 - f. Tailpiece Size: NPS 1-1/2 and standard length to top of bowl.

2.3 TOILET SEATS

A. Toilet Seats; WC-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Church Seats.
 - c. Olsonite Corp.
2. Description: Toilet seat for water-closet-type fixture.
 - a. Material: Molded, solid plastic.
 - b. Configuration: Open front less cover.
 - c. Size: Elongated.
 - d. Hinge Type: Stainless steel, self-sustaining check hinge.
 - e. Class: Extra heavy-duty, commercial.
 - f. Color: White.

2.4 LAVATORIES

A. Lavatories; L-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide American Standard "Lucerne" 0355.012 or a comparable product by one of the following:
 - a. Kohler Co.
 - b. Sloan.
 - c. Zurn Plumbing Products Group.

2. Description: Accessible, wall-mounting, vitreous-china fixture.
 - a. Size: 20 by 18 inches rectangular.
 - b. Faucet Hole Punching: Three holes, 2-inch centers.
 - c. Color: White.
 - d. Overflow: Front.
 - e. Construction: Self-draining deck area with contoured back and side splash shields.
3. Subject to compliance with requirements, provide trim products by one of the following:
 - a. McGuire Manufacturing Company.
 - b. Engineered Brass Company.
 - c. Keeney Manufacturing Company.
4. Lavatory Trim
 - a. Supplies: Chrome-plated copper with 1/2" NPT x 3/8" OD loose key stops.
 - b. Drain: Grid with ADA compliant offset waste.
 - c. Drain Piping: NPS 1-1/4 chrome-plated cast-brass P-trap with cleanout; NPS 1-1/4 17 gauge tubular brass waste to wall; and wall escutcheon.

2.5 LAVATORY FAUCETS

A. Lavatory Faucets; L-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Chicago 802-VE34VPABCP or a comparable product by one of the following:
 - a. T & S Brass and Bronze Works, Inc.
 - b. Zurn Plumbing Products Group; Commercial Brass Operation.
2. Description: Manual-control mixing valve. Coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 1.5 gpm.
 - d. Mixing Valve: Two-handle.
 - e. Centers: 4-inch.
 - f. Mounting: Deck, exposed.
 - g. Valve Handles: Lever with color coded index button.
 - h. Inlet(s): NPS 1/2 male shank.
 - i. Spout Outlet: Aerator.
 - j. Operation: Quarter-turn compression, renewable, manual.

2.6 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers; L-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Truebro 103 E-Z or a comparable product by one of the following:

- a. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
 - b. Plumberex Specialty Products Inc.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot and cold water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
 - a. Material: Molded vinyl.
 - b. Nominal Thickness: 1/8" constant wall.
 - c. UV Protection: Required.
 - d. Fasteners: Internal, reusable fasteners.
 - e. Color: White.

2.7 FIXTURE SUPPORTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Josam Company.
 2. Smith, Jay R. Mfg. Co.
 3. Tyler Pipe; Wade Div.
 4. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 5. Zurn Plumbing Products Group; Specification Drainage Operation.
- B. Lavatory Supports; L-1:
 1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- J. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- K. Install toilet seats on water closets.
- L. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- M. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 20 Section "Common Work Materials and Methods for Fire Suppression, Plumbing, and HVAC."
- N. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.4 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.

- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000

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SECTION 226315 – NATURAL GAS PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following natural gas piping specialties:
 - 1. Gas regulators.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Natural gas piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 GAS REGULATORS

- A. Gas Pressure Reducing Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cashco.
 - b. Equimeter
 - c. Fisher.
 - d. Rockwell.
 - 2. Construction
 - a. Valve body: Cast iron.
 - b. Diaphragm case: Die-cast aluminum.
 - c. Diaphragm: Buna-N with nylon fabric reinforcement.
 - d. Orifices: Interchangeable brass.
 - 3. Operation: Single stage diaphragm type.
 - 4. Temperature limits: -20°F to 150°F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 20 Section "Pipe, Valves, Fittings, and Hangers for Fire Suppression, Plumbing, and HVAC." for piping joining materials, joint construction, and basic installation requirements.
- B. Piping installation requirements are specified in other Division 20 Sections. Drawings indicate general arrangement of piping and specialties.
- C. Where gas pressure reducing valves are not located outdoors and away from building openings, relief vent shall be plumbed directly to outside. Multiple vents may be combined.

3.2 FIELD QUALITY CONTROL

- A. Remove and replace malfunctioning natural gas piping specialties and retest as specified herein.

END OF SECTION 226315

SECTION 230593 – TESTING AND BALANCING

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 testing, adjusting and balancing of HVAC Systems to produce design objectives, including the following:
 - 1. Adjusting fans and ducts to deliver design air flow.
 - 2. Adjusting diffusers, registers and grilles to supply, return or exhaust design air flow.
 - 3. Adjusting diffusers, registers and grilles to minimize drafts.
 - 4. Adjusting all zones for design supply and return air flow.
 - 5. Adjusting fans to design rpm.
 - 6. Sheet metal shop drawing review prior to ductwork installation, review the Sheet Metal Contractor's duct fabrication drawings and mark any additional balancing dampers, etc. that are required for proper balancing of the systems. This Contractor shall receive two copies from the Sheet Metal Contractor and shall return one copy to Sheet Metal Contractor.
 - 7. Adjust RTU to deliver design airflow.
 - 8. Adjust Vertical Unit Ventilator E. valve dampers to deliver design airflow.

1.3 SUBMITTALS

- A. Bidding Documents
 - 1. If so requested on the bid form Submit name of the Test and Balance Agency to Architect/Engineer as a subcontractor on the Materials and Subcontractors Listing.
 - 2. If the Contractor fails to submit name of selected Test and Balance Agency, the Architect/Engineer will select the agency of his choice and Contractor must then issue purchase order for this work as directed.
- B. Certificate: Selected and approved agency shall submit certificate immediately upon receipt of test and balance contract.
- C. Data Sheets
 - 1. Submit type written data sheets on each item of testing equipment to be used.
 - 2. Include name of device, manufacturer's name, model number, latest date of calibration and correction factors.
- D. Report Forms
 - 1. Submit specimen copies of the balance report set-up including addendums and alternates before starting work on site.

2. Submit 30, 60, 90 percent site visit reports on installation of HVAC systems.
3. Forms shall be 8-1/2" x 11" paper for loose-leaf binding, with blanks for listing of the required test ratings and for certification of report.
4. Submit preliminary pencil copies of reports as A/E determines.

E. Final Report

1. Upon completion, all information shall be neatly typed and five copies submitted to the Architect/Engineer with accompanying schematic diagrams of systems tested.
2. All test reports shall be assembled, indexed and submitted in vinyl covered loose-leaf notebooks with project name and Balancing Contractor's name permanently printed thereon.

1.4 QUALITY ASSURANCE

A. Test and Balance Agency

1. Obtain the services of an independent Test and Balance Agency that specializes in, and whose business is limited to, the testing and balancing of air conditioning systems.
2. The agency selected shall be fully certified by the NEBB and shall have at least one member of the agency qualified as a certified test and balance Engineer who has been issued this certification by the National Examining Board.
3. All work shall be done under the direct supervision of a full time member of the organization.
4. All final reports shall be signed and sealed by the certified test and balance Engineer.
5. Approved Test and Balance Contractors:
 - a. Mechanical Systems Balancing
 - b. Total Balance
 - c. Fluid Dynamics
 - d. Gibson Services.
 - e. Midwest Balance
 - f. Synergy Test and Balance
 - g. Bledsoe Test and Balance
6. Agency Contract: Award the contract to the approved Balance Contractor in sufficient time to allow the Test and Balance Contractor to schedule this work in cooperation with other trades involved and comply with the completion date.

B. Instruments

1. The minimum instrumentation for testing, adjusting and balancing shall be the "NEBB Approved Minimum Field Instrumentation."
2. Instruments used for testing and balancing must have been calibrated within a period of six months and checked for accuracy prior to start of work.
3. Instruments must be maintained and carried in such manner to protect them from excessive vibration and moisture conditions.
4. Approval: all products and instrumentation used shall be subject to approval of the Engineer.

C. Procedure - Methodology: testing and balancing shall be performed in complete accordance with NEBB National Standards for Field Measurements and Instrumentation.

D. Conditions: System Operation - heating, ventilating, and air conditioning equipment including filters, shall be completely installed and in continuous operation as required to accomplish the adjusting and balance

work specified. Test and Balance Agency shall give a Check List to the Mechanical and/or Sheet Metal Contractors which, when completed, and returned, will assure the systems are ready to be balanced. A/E shall receive a copy of check list from Mechanical and Sheet Metal Contractors when completed.

1.5 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, Commissioning Agent (if applicable) and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide seven (7) days advance notice for each test. Include scheduled test date and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- D. Measurements – Readjustments
 - 1. Should corrective measures caused by faulty installation require retesting, adjusting and balancing, such work shall be at no additional expense.
 - 2. Corrective measures other than the above shall be made only as directed by the Architect/Engineer. Such work shall be at no additional expense.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Air Systems - prior to system testing and balancing
 - 1. Verify that the appropriate contractor has:
 - a. Checked all systems and placed them into a fully operational status.
 - b. Installed new filters within the equipment. Do not continue testing of unit until new filters have been provided.
 - c. Checked temperature and system controls for proper operation.
 - d. Checked fan rotation for proper operation.

3.2 SYSTEM BALANCE

- A. Air Systems - Perform the following minimum tests and balance:
 - 1. Test and adjust supply fans to design requirements. Change sheaves and belts as required to obtain design air quantities. Sheaves and belts to be furnished by respective equipment manufacturer. Sheaves shall be sized so that maximum CFM will be obtained with VFD at 100% speed. Slowing VFD is not an acceptable method to obtain maximum CFM.

2. Test and record motor electrical characteristics, RPM, service factor, measured voltage, full load amperes and connected load amperage. Check and record starter heaters, sizes and ratings, replacing belts sizes, etc.
3. Make pitot tube traverse (minimum of 16 points) of main supply ducts and obtain design CFM at fans. Seal all test holes with suitable hole plugs.
4. Test and record system static pressure, suction and discharge.
5. Test and adjust system for design CFM recirculated air.
6. Test and adjust system for design CFM outside air.
7. Test and record entering air temperatures (DB heating and cooling).
8. Test and record entering air temperatures (WB cooling).
9. Test and record leaving air temperatures (DB heating and cooling).
10. Test and record leaving air temperatures (WB cooling).
11. Adjust all main supply and return air ducts to proper design CFM.
12. Adjust all zones to proper design CFM, supply and return.
13. Test and adjust each diffuser, grille and register to within $\pm 10\%$ of design requirements.
14. Each grille, diffuser and register shall be identified as to location and area. Size, type, flow factor and manufacturer of diffusers, grilles, registers and all tested equipment shall be identified and listed.
15. Readings and tests of diffusers, grilles and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
16. The Balance Contractor shall list all controls requiring adjustment by Temperature Control Contractor and assist Control Contractor with required settings.
17. All diffusers, grilles and registers shall be adjusted to minimize drafts in all areas.

B. Record Data

1. Air Systems - record the following minimum data:
 - a. CFM delivery and RPM of blowers and fans
 - 1) Static pressure at inlet and outlet of blowers and fans
 - 2) All equipment nameplate data
 - 3) Actual running current and voltage of fan motors and settings for solid state overload relays or heater sizes.
 - b. CFM delivered or exhausted at each diffuser, register, or grille.

C. Equipment Cards

1. Install at each piece of equipment a "check out" card showing all significant operating temperatures, pressures, amperes, voltages, brake horsepower, etc. Check out cards shall be standard 5" x 8" index cards enclosed in vinyl card folders securely attached to equipment or wall in immediate area.

D. Owner's Instructions: Balancing Contractor shall arrange with the Owner at a time for the instruction of the Owner's personnel as to the proper operation and maintenance of the equipment.

3.3 ADDITIONAL TEST

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.**

B. Seasonal Periods

1. If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions, if so requested by Owner/Engineer.

END OF SECTION 230593

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SECTION 233113 – METAL DUCTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Dual wall insulated duct and fittings
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated.

1. Static-Pressure Classes:

- a. Supply Ducts: 2-inch wg.
- b. Return Ducts (Negative Pressure): 2-inch wg.

2. Leakage Class:

- a. Rectangular Supply-Air Duct: 6 cfm/100 sq. ft. at 1-inch wg.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.

3. Duct layout indicating sizes, configuration, and static-pressure classes.
 4. Elevation of top of ducts.
 5. Dimensions of main duct runs from building grid lines.
 6. Fittings.
 7. Reinforcement and spacing.
 8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
 13. The construction documents are not fabrication drawings and are not intended to show all offsets as required for proper ductwork installation. Contractor to field verify all existing conditions and prepare fabrication drawings based on existing conditions. All additional offsets shall be included in bid price.
 14. Submit 2 copies of sheet metal fabrication drawings to Testing and Balancing Contractor for his review prior to submitting to engineer.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.
- D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Exposed ductwork in finished areas shall have "paint-grip" finish. Ductwork will be field painted.

2.2 DUAL WALL INSULATED DUCT AND FITTINGS

A. General

- 1. Construct to pressure classification as noted in Part 1 of this specification section.
- 2. Construction in general shall be comprised of an airtight, outer pressure shell, a 1" insulation layer and perforated metal inner liner that completely covers the insulation throughout the system.
- 3. Insulation shall have the following UL maximum rating: Flame Spread 25; Smoke Developed 50.
- 4. Outer pressure shell and inner liner shall be manufactured from galvanized steel, meeting ASTM A-527-67 in following minimum gauges:

NOMINAL DUCT SIZE 3-6" 7-20" 21-34" 35-48" 49"&UP

Duct-Outer Pressure Shell	26*	24*	22*	20*	16**
Duct-Inner Perforated Liner	24*	24*	24*	24*	20
Fitting-Outer Pressure Shell	20	20	20	18	16
Fitting-Inner Perforated Liner	20	20	20	20	20

* Gauges if made from spiral duct

** Longitudinal seam, continuous butt weld

- 5. Divided flow fittings are to be made as separate fittings, not tap collars into duct sections, with the following construction requirements:
 - a. Sound airtight continuous welds at intersection of fitting body and tap.
 - b. Tap liner securely welded to inner liner with weld spacing not to exceed 3".
 - c. Insulation to be packed around branch tap area for complete cavity filling.
 - d. Branch connection is to be carefully fit to cut- out openings in inner liner without spaces for air erosion of insulation or sharp projections for noise and air flow disturbances.
- 6. All seams in pressure shell of fittings are to be continuous welded. Galvanized areas that have been damaged by welding shall be coated with corrosion resistant aluminum paint.
- 7. Perforations are not to exceed 3/32" diameter.

8. Inner liners of both duct and fittings are to be adequately supported by metal spacers welded in position to maintain spacing and concentricity.
- B. Coupling: an inner coupling should be provided to align the inner lining to maintain good air flow conditions equivalent to standard round high pressure duct joints. Butt joints are not suitable for inner liner. This alignment may be accomplished by liner of fitting for slip-joint into pipe or by use of double, concentric coupling with two couplings held by spacers for rigidity and wall spacing. Above 34" I.D., a separate coupling should be provided for inner alignment with pressure shells joined by angle ring flanged connections.
- C. Insulation Ends: at end of an insulated section or run, where internally insulated duct connects to uninsulated spiral duct or fitting, fire damper or flex, an insulation end fitting shall be installed to bring the outer pressure shell down to nominal size.
- D. All dual wall duct to have paint grip finish. To be painted white by Painting Contractor.
- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Lindab Inc.
 2. McGill Air Flow LLC.
 3. SEMCO Incorporated
 4. Sheet Metal Connectors, Inc.
 5. United Sheet Metal
 6. LaPine
 7. Eastern Sheet Metal
 8. JTD Spiral Inc.

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 1. Galvanized Coating Designation: G60.
 2. Finishes for Surfaces Exposed to View: paint grip finish.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 4 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Non-corrosive Environments: Cadmium-plated steel rods and nuts. Clean/degrease for painting where applicable.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure Showing 5-1, "Rectangular Duct Hangers Minimum Size," and Figure showing 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 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.**
- B. Install dual wall insulated duct in exposed areas as noted on Drawings.
- C. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- D. Install round ducts in maximum practical lengths.
- E. Install ducts with fewest possible joints.
- F. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- G. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- I. Install ducts with a clearance that will allow for insulation thickness.
- J. Route ducts so that they do not pass through transformer vaults, electrical equipment rooms, stairwell enclosures and elevator equipment rooms.

- K. Where ducts pass through non-fire-rated interior partitions and exterior walls, cover the opening between the partition and duct or duct insulation with sheet metal flanges (picture frames) of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- L. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- M. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with "Intermediate Level" standards as identified in SMACNA's "Duct Cleanliness for New Construction Guidelines." All ducts and air openings on equipment shall be covered and protected throughout construction until ready for use.

3.2 SEAM AND JOINT SEALING

- A. Seal duct seams and joints for duct static-pressure and leakage classes specified in "Performance Requirements" Article, according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 1-1, "Standard Duct Sealing Requirements," unless otherwise indicated.
- B. Seal Classes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table showing 1-1, "Standard Duct Sealing Requirements."

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter for, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 2. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 3. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table showing 5-1, "Rectangular Duct Hangers Minimum Size," and Table showing 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports. Clean/degrease where painting is to occur.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- G. Install stiffener's, turning vanes, and or air straighteners as required to stop objectionable duct oil canning, or fan surge to the satisfaction of the engineer.

3.4 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.5 DUCT SCHEDULE

- A. Fabricate supply, return, outdoor air, and relief air ducts with galvanized sheet steel unless noted otherwise on drawings or within specifications.
- B. Ductwork exhausting high moisture airstreams, such as shower rooms and locker rooms, shall be fabricated from aluminum or stainless steel. All commercial dishwasher ductwork shall be stainless steel below the ceiling or where exposed. Ductwork above ceilings may be stainless steel or aluminum.
- C. Exhaust ductwork from fume hoods and science labs shall be fabricated from stainless-steel or PVC coated sheet steel unless noted otherwise.
- D. Intermediate Reinforcement:
 - 1. Galvanized-Steel Ducts: Galvanized steel.
- E. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure showing, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure showing, "Vanes and Vane Runners," and Figure showing, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure showing, "Vanes and Vane Runners," and Figure showing, "Vane Support in Elbows."
 - 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure showing, "Round Duct Elbows."

- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table showing, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.
- F. Branch Configuration:
- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connections."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry. No spin-in type fittings allowed.
 - 2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.
- G. Escutcheons:
- 1. For all duct penetrations thru walls into finished areas duct shall have neat shop fabricated picture frame escutcheon on finished side of wall.
 - a. This applies to both round and square duct work.
 - b. Externally insulated ducts to have escutcheon oversized by thickness of insulation.
 - c. Ducts without insulation to have escutcheon tight to exterior of duct.
 - d. Escutcheon to be fastened to wall and not duct.
 - e. Escutcheon to be of quality finish and paintable.

END OF SECTION 233113

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SECTION 233114 – EXTERIOR PRE-INSULATED DUCTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Access doors
3. Sheet metal materials.
4. Sealants and gaskets.
5. Supports.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Metal Ducts" for duct liner.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated.

1. Static-Pressure Classes:

- a. Supply Ducts: 2-inch wg.
- b. Return Ducts (Negative Pressure): 2-inch wg.

2. Leakage Class:

- a. Rectangular Supply-Air Duct: 6 cfm/100 sq. ft. at 1-inch wg.

B. Structural Performance: Duct supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.

4. Elevation of top of ducts.
 5. Dimensions of main duct runs from building grid lines.
 6. Fittings.
 7. Reinforcement and spacing.
 8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
 13. The construction documents are not fabrication drawings and are not intended to show all offsets as required for proper ductwork installation. Contractor to field verify all existing conditions and prepare fabrication drawings based on existing conditions. All additional offsets shall be included in bid price.
 14. Submit 2 copies of fabrication drawings to Testing and Balancing Contractor.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.
- D. Coordination Drawings: Plans, drawn to scale showing duct sizes, routing and supports.

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. Product:
1. Basis of Design Product; Thermaduct.
 2. Approved Systems.
 - a. Armacell Arma Tuff Plus II over Galvanized Ductwork
 - b. Qduct by AQC Industries
 - c. Armacell Arma Tuff Plus II over Galvanized Ductwork
 - d. Approved equal system
- B. The panel shall be manufactured of CFC-free closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, IR reflective 1000-micron high impact resistant titanium infused vinyl is factory bonded using a full lamination process. The lamination process shall permanently bond the vinyl clad to the outer surfaces of the phenolic foam panel to provide a zero-permeability watertight barrier and to form a structurally insulated panel (SIP) in which to form duct segments. Processes that do not employ a full lamination process are not acceptable. Self-applied adhesives such as tapes, caulks or cladding that incorporate pressure sensitive or spray adhesives are not acceptable.
- C. The thermal conductivity shall be no greater than 0.146BTU • in/HR • ft² • °F.
- D. The density of the foam shall not be less than 3.5 pcf with a minimum compressive strength of 28 psi.

E. The panel thickness shall be as specified below:

1. Maximum Temperature: Continuous rating of 185°F inside ducts or ambient temperature surrounding ducts.
2. Maximum Thermal Conductivity: 0.146 Btu x in./h x sq. ft. x deg F at 75°F mean temperature.
3. Permeability: 0.00 perms maximum when tested according to ASTM E 96/E 96M, Procedure A.
4. Antimicrobial Agent: Additive for antimicrobial shall not be used but instead, raw product must pass UL bacteria growth testing.
5. Noise-Reduction Coefficient: 0.05 minimum when tested according to ASTM C 423, Mounting A.
6. Required Markings: All interior duct liner shall bear UL label and other markings required by UL 181 on each full sheet of duct panel; UL ratings for internal closure materials.
7. All insulation materials shall be closed cell with a closed cell content of >90%.
8. R-value:
 - a. 1 ¾ Thick Panel: 12 R

F. Closure Materials:

1. V-Groove Adhesive: Silicone (interior only)
2. UV stable 1000-micron high impact resistant titanium infused vinyl (exterior).
 - a. Factory manufactured seamless corners for zero perms.
 - b. Cohesive bonded over-lap at corner seam covers for zero perms.
 - c. Water resistant titanium infused welded vinyl seams.
 - d. Mold and mildew resistant.
3. Polymeric Sealing System:
 - a. Structural Membrane: Aluminum scrim with woven glass fiber with UV stable vinyl clad applied.
 - b. Minimum Seam Cover Width: 2 7/8 inches (75 mm)
 - c. Sealant: Low VOC
 - d. Color: White
 - e. Water resistant
 - f. Mold and mildew resistant
4. Duct Connectors:
 - a. Factory manufactured galvanized 4-bolt flange.

G. Outdoor Cladding

1. Outdoor Installations: Duct segments shall incorporate UV stable 1000 micron high impact resistant titanium infused vinyl which is introduced during the manufacturing process.

H. Flange coverings

1. Flanges are field sealed airtight before flange covers are installed. Flange covering consists of the following:
 - a. Foam tape insulation with molded 39 mil covers.
 - b. Air gap (heating only application) with molded 39 mil covers.

- I. Reinforcement
 - 1. Thermaduct shall provide designed and built with adequate reinforcement to both; withstand air pressure forces from within the duct from blower pressure and shall be built to handle expected snow load for the location where the system is being installed.
- J. Weight
 - 1. Ductwork shall provide low weight stresses on the building framing and support members. Assembled duct system shall have a weight of 0.86 lbs. per square foot to maximum weight of 2/7 lbs. per square foot (depending on R-value and reinforcement requirement). Hangers and tie-downs are to be detailed for review prior to installation but not exceeding 13' for duct girth <84" and 8' for duct girth >85" between hangers and designed to carry the weight and wind load of the ductwork.

PART 3 - EXECUTION

3.1 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.**
- B. Where ducts pass through non-fire-rated interior partitions and exterior walls, cover the opening between the partition and duct or duct insulation with sheet metal flanges (picture frames) of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- C. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- D. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with "Intermediate Level" standards as identified in SMACNA's "Duct Cleanliness for New Construction Guidelines." All ducts and air openings on equipment shall be covered and protected throughout construction until ready for use.

3.2 SHOP FABRICATION

- A. Certification:
 - 1. Ducts shall be detailed and fully factory manufactured by an authorized Thermaduct, LLC facility system. All fabrication labor will be certified "yellow label" building trade professionals, compliant to SMWIA and SMACNA labor guidelines (work preservation observed).
- B. Fabrication:
 - 1. Fabricated joints, seams, transitions, reinforcement, elbows, branch connections, access doors and panels, and damage repairs according to manufacturer's written and detailed instructions.
 - 2. Fabricated 90-degree mitered elbows to include turning vanes.
 - 3. Fabricated duct segments in accordance with manufacturer's written details.

4. Duct fittings shall include 6 inches of connecting materials, as measured, from last bend line to the end of the duct. Connections on machine manufactured duct may be 4 inches.
5. Fabricated duct segments utilizing v-groove method of fabrication. Factory welded or cohesively bonded seams will apply to fully manufactured ductwork and fittings. Internal seams will be supplied with an unbroken layer of low VOC silicone or bonding (for paint shop applications). Each duct segment will be factory supplied with either aluminum grip pro-file or pre-insulated duct connectors in accordance with manufacturer's detailed submittal guide. Applied duct reinforcement to protect against side deformation from both positive and negative pressure per manufacturer's design guide based on specified ductwork size and system pressure.
6. Designed and fabricated duct segments and fittings will be in accordance with "SMACNA Phenolic Duct Construction Standards" latest edition.
7. Both positive and negative ductwork and fittings shall be constructed to incorporate a UL Listed as a Class 1 air duct to Standard for Safety UL 181 liner with an exterior clad for permanent protection against water intrusion.
8. Duct shall be constructed to exceed requirements for snow and wind loads.

3.3 DUCT INSTALLATION

- A. Duct segments shall be installed per the manufacturer's guidelines by competent HVAC installers.
- B. Install ducts and fittings to comply with manufacturer's installation instructions as follows:
 1. Install ducts with fewest possible joints.
 2. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
 3. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
 4. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."
 5. Use prescribed duct support spacing as described in this specification and manufacturer's recommendations.
- C. Air Leakage: Duct air leakage rates to be in compliance with "SMACNA HVAC Air Duct Leakage Test Manual" latest version per applicable leakage class based on pressure.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Contractor to ensure that the ductwork system is properly and adequately supported per the manufacturer's guidelines.
 1. Ensure that the chosen method is compatible with the specific ductwork system requirements. Pre-installation should be provided prior to work commencement by installing contractor for approval.
 2. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Supports on straight runs of ductwork shall be positioned at centers not exceeding 13 feet for duct sections when fabricated in 13 foot lengths with duct girth less than 84". Larger duct sizes and short segments with duct girth greater than 84" are to be supported at 8 foot centers or less, in accordance with manufacturer's guidelines, prior to work commencement.

- C. Ductwork shall be supported at changes of direction, at branch duct connections, tee fittings, parallel under turning vanes and all duct accessories such as dampers, etc.
- D. The load of such accessories to the ductwork shall be neutralized by the accessory support.

3.5 FIELD QUALITY CONTROL

- A. Inspection: Arrange for manufacturer's representative to inspect completed installation and provide written report that installation complies with manufacturer's written instructions.
 - 1. Remove and replace duct system where inspection indicates that it does not comply with specified requirements.
- B. Perform additional testing and inspecting, at the Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.6 DUCT SCHEDULE

- A. Outdoor Ducts and Fittings:
 - 1. Rectangular Ducts and Fittings:
 - a. Minimum Panel Thickness: 31 mm
 - b. Cladding: minimum 0.038 inch

END OF SECTION 233114

SECTION 233300 – AIR DUCT ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Materials.
 - 2. Flange connectors.
 - 3. Turning vanes.
 - 4. Flexible connectors.
 - 5. Duct accessory hardware.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work on $\frac{1}{4}" = 1'-0"$ scale drawings.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.
 - 2. The construction documents are not fabrication drawings and are not intended to show all offsets as required for proper ductwork installation. Contractor to field verify all existing conditions and prepare fabrication drawings based on existing conditions. All additional offsets shall be included in bid price.
- C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.3 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. METALAIRE, Inc.
 - 4. SEMCO Incorporated.
 - 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.4 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ventfabrics, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd.
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 20 to plus 200 deg F.
- E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd.
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 20 to plus 250 deg F.
- F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.5 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts and aluminum accessories in aluminum ducts.
- C. Install backdraft and/or control isolation dampers at outlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Install volume dampers at all locations as required for balancing whether shown or not. Dampers specified on backs of grilles shall not be used for balancing unless approved by Engineer.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire, smoke, combination fire and smoke and ceiling radiation dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 3. At changes of direction of kitchen hood exhaust ducts.
 - 4. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
 2. Two-Hand Access: 12 by 6 inches.
 3. Head and Hand Access: 18 by 10 inches.
 4. Head and Shoulders Access: 21 by 14 inches.
 5. Body Access: 25 by 14 inches.
 6. Body plus Ladder Access: 25 by 17 inches.
- K. Label access doors according to Section 200050.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct rated at 10" static, strapped in place with 3 sheet metal screw stop keep straps from blowing off ducts. Do not use flexible ducts to change directions.
- O. Connect diffusers or light troffer boots to low-pressure ducts with maximum 36-inch lengths of flexible duct (rated at 4" static) strapped in place.
- P. Connect flexible ducts to metal ducts with draw bands plus sheet metal screws.
- Q. Install duct test holes where required for testing and balancing purposes.
- R. All dampers that penetrate building envelope shall be insulated dampers. This includes all exhaust, return and relief dampers.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. Operate dampers to verify full range of movement.
 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 3. Operate fire, smoke and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 4. Inspect turning vanes for proper and secure installation.
 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

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SECTION 233713 – DIFFUSERS, REGISTERS, GRILLES AND LOUVERS

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 ceiling-, floor- and wall-mounted diffusers, registers, and grilles.

This Section includes but is not limited to:

- 1. Grilles and Registers
- 2. Eggcrate Return Grilles

- B. Related Sections include the following:

- 1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts. Coordinate with Architect as to whom is supplying grilles.
- 2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

- A. Product Data: For each product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 GRILLES AND REGISTERS

- A. Manufacturers:
 - 1. Price Industries
 - 2. Titus
 - 3. Nailor Industries
 - 4. MetalAire

- B. Capacity, size, and noise criteria as Scheduled(Return and Exhaust). Additional sizes may be required as indicated and noted on individual Drawings.
- C. Material: Heavy gauge steel or heavy gauge aluminum. Provide aluminum construction for installations in shower rooms and corrosive environments.
- D. Finish: Baked enamel, white (unless noted otherwise on Drawings).
- E. Mounting: Countersunk screws
- F. Frame: 1-1/4" wide.
- G. Metal plaster frames: for grilles mounted on plaster, masonry, fiber or metal construction surfaces.
- H. Panel mounted where installed in T-bar ceilings unless noted otherwise.
- I. Volume Damper: Opposed blade operable through face of grille.
- J. Deflecting Blades: 3/4" spacing

2.2 EGG CRATE RETURN GRILLES

- A. Manufacturers:
 - 1. Price Industries
 - 2. Titus 50F
 - 3. Nailor Industries
 - 4. MetalAire
- B. Material: Aluminum
- C. Core Construction: 1/2" x 1/2" x 1/2" aluminum grid core.
- D. Finish: Baked enamel, white (unless noted otherwise on Drawings).
- E. Mounting: 1-1/4 aluminum border with countersunk screw holes for surface mounting.
- F. Installation:
 - 1. Install internally lined acoustical boot on back of grilles unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel if

not of panel dimension. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

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SECTION 237413 – PACKAGED ROOFTOP UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
 - 1. Direct-expansion cooling.
 - 2. Gas fired heat exchanger.
 - 3. Economizer outdoor- and return-air damper section.
 - 4. Roof curbs.

1.2 SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and maintenance data.
- D. Warranty.

1.3 QUALITY ASSURANCE

- A. ARI Compliance:
 - 1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTU's.
 - 2. Comply with ARI 270 for testing and rating sound performance for RTU's.
- B. ASHRAE Compliance:
 - 1. Comply with ASHRAE 15 for refrigerant system safety.
 - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - 3. Comply with ASHRAE/IESNA 90.1 for minimum efficiency of heating and cooling.
- C. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.
- D. UL Compliance: Comply with UL 1995.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTU's that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: 5 year parts warranty for all compressors.
 - 2. Warranty Period for Gas Furnace Heat Exchangers: 10 year parts warranty on all units from date of Substantial Completion.
 - 3. Warranty Period for Entire Unit: 1 year parts and labor from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carrier Corporation.
 - 2. Trane
 - 3. Johnson Controls
 - 4. Daikin-McQuay
 - 5. AAON

2.2 CASING

- A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels shall be provided on units as indicated on the schedule. Double wall units shall have fiberglass insulation sandwiched between heavy gauge steel sheets to form a durable, rigid casing to withstand higher working pressures and impact forces. Double wall casing shall eliminate erosion of insulation material and contamination of the air stream.
- B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
- C. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - 1. Materials: ASTM C 1071, Type I.
 - 2. Thickness: 1/2 inch.
 - 3. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or faced with a plain or coated fibrous mat or fabric.
 - 4. Liner Adhesive: Comply with ASTM C 916, Type I.
- D. Condensate Drain Pans: Formed sections of stainless-steel sheet, a minimum of 2 inches deep, and complying with ASHRAE 62.
 - 1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
 - 2. Drain Connections: Threaded nipple both sides of drain pan.
 - 3. Pan-Top Surface Coating: Corrosion-resistant compound.

2.3 FANS

- A. Belt-Driven or Direct-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls. Fans housings shall be isolated from unit.
- B. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.
- C. Fan Motor: Comply with requirements in Division 20 Section "Common Materials and Methods for Fire Suppression, Plumbing and HVAC."

2.4 COILS

- A. Supply-Air Refrigerant Coil:
 - 1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
 - 2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
 - 3. Coil Split: Interlaced.
 - 4. Condensate Drain Pan: Stainless steel formed with pitch and drain connections complying with ASHRAE 62.

2.5 REFRIGERANT CIRCUIT COMPONENTS

- A. Number of Refrigerant Circuits: As indicated on equipment schedule.
- B. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief.
- C. Refrigeration Specialties:
 - 1. Refrigerant Charge: R-410A.
 - 2. Expansion valve with replaceable thermostatic element.
 - 3. Refrigerant filter/dryer.
 - 4. Manual-reset high-pressure safety switch.
 - 5. Automatic-reset low-pressure safety switch.
 - 6. Minimum off-time relay.
 - 7. Automatic-reset compressor motor thermal overload.
 - 8. Brass service valves installed in compressor suction and liquid lines.

2.6 AIR FILTRATION

- A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - 1. 2" Pleated: Minimum 30 percent arrestance, and MERV 13.
 - 2. Provide quantity of filters as noted in Section 200010 Common Work Results.

2.7 GAS FIRED HEAT EXCHANGER

- A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.
 - 1. CSA Approval: Designed and certified by and bearing label of CSA.
- B. Burners: Stainless steel with a minimum thermal efficiency of 80 percent.
 - 1. Fuel: Natural gas.
 - 2. Forced Combustion Blower.
 - 3. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.
- C. Heat-Exchanger and Drain Pan: Aluminized Steel.
- D. Venting: Gravity vented with vertical extension flue shield.
- E. Safety Controls:
 - 1. Gas Control Valve: Minimum of Two stages.
 - 2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.8 DAMPERS

- A. Outdoor-Air Damper: Linked damper blades, for 0 to 100 percent outdoor air, with damper filter.
- B. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
 - 1. Damper Motor: Modulating with adjustable minimum position.
 - 2. Relief-Air Damper: Gravity actuated with bird screen and hood.

2.9 ELECTRICAL POWER CONNECTION

- A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit.
- B. Unit shall have a minimum SCCR value of 22 kA RMS Symmetrical.

2.10 CONTROLS

- A. Thermostats for single zone rooftop unit applications shall be for use with respective unit stage configuration. Zone sensors shall not override unit microprocessors controls but shall allow for adjustment of scheduling and space set point. See drawings for locations.
- B. Controller:
 - 1. Controller shall have volatile-memory backup.

2. Safety Control Operation:
 - a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
 - b. Firestats: Stop fan and close outdoor-air damper if air greater than 130 deg F enters unit. Provide additional contacts for alarm interface to fire alarm control panel.
 - c. Fire Alarm Control Panel Interface: Provide control interface to coordinate with operating sequence described in Division 28 Section "Fire Detection and Alarm."
3. Unoccupied Period:
 - a. Heating Setback: 10 deg F.
 - b. Cooling Setback: System off.
 - c. Override Operation: Three hours.
4. Supply Fan Operation:
 - a. Occupied Periods: Cycle fan to maintain occupied temperature.
 - b. Unoccupied Periods: Cycle fan to maintain setback temperature.
5. Refrigerant Circuit Operation:
 - a. Occupied Periods: Cycle or stage compressors to match compressor output to cooling load to maintain discharge temperature. Cycle condenser fans to maintain maximum hot-gas pressure.
 - b. Unoccupied Periods: Compressors off.
6. Gas Furnace Operation:
 - a. Occupied Periods: Modulate burner to maintain discharge temperature.
 - b. Unoccupied Periods: Cycle burner to maintain setback temperature.
7. Fixed Minimum Outdoor-Air Damper Operation:
 - a. Occupied Periods: Open to 25 percent or as scheduled.
 - b. Unoccupied Periods: Close the outdoor-air damper.
8. Economizer Outdoor-Air Damper Operation:
 - a. Occupied Periods: Open to 100 percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II. Controller shall permit air-side economizer operation when outdoor air is less than 60 deg F. During economizer cycle operation, lock out cooling.
 - b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

2.11 ACCESSORIES

- A. Powered 110 Volt Convenience Outlet: Outlet shall come from factory installed and powered by a stepdown transformer so it can be used whether or not the unit is operating.
- B. Hinged access panels.

- C. Unit mounted non-fused disconnect switch.
- D. Microprocessor controller with DDC BACnet interface.
- E. Hail Guards

2.12 ROOF CURBS

- A. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards. Gas and electrical connections shall be through the curb.
 - 1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - a. Materials: ASTM C 1071, Type I or II.
 - b. Thickness: 2 inches.
 - 2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
 - a. Liner Adhesive: Comply with ASTM C 916, Type I.
 - b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
 - c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
- B. Curb Height: 16 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Roof Curb: Install on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Division 07 Section "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.
- B. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.
- C. For horizontal discharge applications, provide flexible canvas duct connection to isolate ductwork from unit.
- D. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain. Provide suitable pipe supports as required.
- E. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
 2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
 3. Connect supply ducts to RTUs with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."
 4. Install return-air duct continuously through roof structure.
- F. Infill roof curb at roof deck except at duct penetrations with 2" rigid, unfaced fiberglass insulation above 3 layers of 5/8" gypsum board.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.
- C. Tests and Inspections:
1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.

3.3 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.
- B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

END OF SECTION 237414

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SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Scope of Work
2. Codes and Standards
3. Coordination Between Contractors
4. Work and Workmanship
5. Drawings
6. Submittals
7. Operation and Maintenance Manuals
8. Permits
9. Minor Deviations
10. Record Drawings
11. Project Closeout
12. Guarantee
13. Inspection
14. Assignment of Miscellaneous Work
15. Materials and Equipment
16. Product and Material Approval
17. Equipment Delivery Schedule
18. Material Storage
19. Temporary Use of Equipment
20. Caulking and Fire Stopping
21. Attaching to Building Construction
22. Electrical Connections to Equipment
23. Escutcheons
24. Equipment Installation
25. Occupational Safety & Health Administration
26. Utility Services
27. Temperature Control and Building Management Systems
28. Electrical Demolition

B. Related Requirements:

1. Contractor shall thoroughly review entire bid documents, including all drawings and specifications prior to bidding and include all required electrical work in his bid, even if not shown on electrical plans and specification.

1.2 SCOPE OF WORK

- A.** This section of Specifications contains instructions and information applicable to the electrical contractor and his subcontractors.

- B. In event of conflict between the requirements in Drawings, the General Provisions, or the Specifications, the bidder shall inform Engineer of such conflict in writing not later than five days before bids are due. If such notification is not provided, Contractor shall accept Engineer's resolution of conflicts without any further compensation.
- C. This Section contains a general scope of work to be performed under this contract; however, this section does not include all work to be performed, only a general description of the project.
 - 1. All electrical equipment indicated herein and as indicated on Drawings to make this structure electrically complete.
 - 2. Provide interior lighting and controls.
 - 3. Provide wiring devices.
 - 4. Provide electrical distribution, including panels and feeders.
 - 5. Provide branch circuit wiring.
 - 6. Provide connections and controls for Kitchen equipment and HVAC equipment.
 - 7. Provide overcurrent protection.
 - 8. Provide grounding and bonding.
- D. Refer to Division 01 Section "Temporary Facilities and Controls" for temporary power requirements.

1.3 CODES AND STANDARDS

- A. Materials and workmanship shall comply with Code.
- B. Codes and standards shall include state laws, local ordinances, utility company regulations and requirements of nationally accepted codes and standards.
- C. In case of difference between building codes, specifications, state laws, local ordinances, industry standards and utility company regulations and contract documents, the most stringent shall govern. Contractor shall promptly notify Engineer in writing of such difference.
- D. Non-compliance: Should Contractor perform any work that does not comply with requirements of applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- E. Building Codes: Indiana Building Code; Indiana Plumbing Code; Indiana Mechanical Code; Indiana Electrical Code and American Disabilities Act Title III, Appendix ADAAG.
- F. These requirements are to be considered minimum and are to be exceeded when so indicated on Drawings or herein specified.
- G. Industry Standards, Code and Specifications
 - 1. ADA Americans with Disabilities Act
 - 2. ANSI American National Standards Institute
 - 3. ASTM American Society for Testing and Materials
 - 4. ETL Electrical Testing Laboratories
 - 5. IEEE Institute of Electrical and Electronics Engineers
 - 6. ICEA Insulated Cable Engineers Association
 - 7. NECA National Electrical Contractors Association
 - 8. NEMA National Electrical Manufacturers Association
 - 9. NESC National Electrical Safety Code

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| 10. | NFPA | The National Fire Protection Association |
| 11. | NIST | National Institute of Standards and Technology |
| 12. | OSHA | Occupational Safety & Health Administration |
| 13. | UL | Underwriters Laboratory Inc. |

1.4 COORDINATION BETWEEN CONTRACTORS

- A. Each contractor and subcontractor shall study all Drawings applicable to Work, so complete coordination between trades will be affected. Special attention shall be given to points where ducts cross other ducts or piping, where pipes, ducts and conduit pass through walls and columns, etc.
- B. It is responsibility of each Contractor and Subcontractor to leave necessary room for other trades. No extra compensation will be allowed to cover cost of removing piping, conduit, ducts or equipment found encroaching on space required by others.
- C. Refer to Part 3 Article "Equipment Installation."
- D. All power outages shall be scheduled in advance with the Owner. At least two weeks advance notice is required for power transfers to allow for building user notification and scheduling.

1.5 WORK AND WORKMANSHIP

- A. Provide all required labor, materials, equipment and contractor's services necessary for complete installation of systems required in full conformity with requirements of authorities having jurisdiction, all as indicated on Drawings and herein specified.
- B. Finished job shall be functional and complete in every detail including any and all such items required for complete system, whether or not these items be specified or shown on Drawings.
- C. Special attention shall be given to accessibility of working and controlling parts. Adjustable parts shall be within easy reach. Removable parts shall have space for removal.
- D. Each contractor shall acquaint himself with details of all work to be performed by other trades and take necessary steps to integrate and coordinate his work with other trades.
- E. It is assumed that electrical contractor is familiar with standard first-class installation procedures. Therefore, the Specifications do not attempt to include every detail or operation necessary for complete installation.
- F. Wherever tables or schedules show quantities of materials, they shall not be used as final count. These figures serve only as a guide to contractor. Each contractor shall be responsible for furnishing all materials indicated on Drawings and in Specifications.
- G. Electrical contractor shall be responsible for the protection, safekeeping and cleanliness of all existing equipment, material, etc. located in spaces to be remodeled in which he is working. As part of his responsibility, he shall provide necessary covers, structures, etc., as required to keep all dirt, water, moisture and dust from equipment. Method the contractor proposes to use in protecting equipment shall be coordinated with Engineer and Owner's Representative for approval before any work is started. Any damage sustained during construction shall be corrected or replaced by electrical contractor.
- H. Refer to Part 3 Article "Equipment Installation."

1.6 DRAWINGS

- A. Conduit runs are not shown on Drawings. Care shall be taken to coordinate conduit runs with piping, ductwork and other equipment to be installed by other trades. Routing of large conduits or groups of conduits shall be approved by the Engineer.
- B. In general, junction boxes are not shown on Drawings. Contractor may install small junction boxes, concealed above ceilings, at his discretion as long as they are accessible. Large junction boxes or those exposed in walls or ceilings shall have locations approved by Engineer.
- C. In general, number of wires for electrical circuits is not shown on Drawings. Number of wires required shall be installed to provide indicated functions. Verify all wiring requirements.
- D. Wiring requirements for special systems may vary between acceptable manufacturers; conduit system or riser diagram shown will be that required by indicated manufacturer, but it shall be the contractor's responsibility to obtain wiring requirements from manufacturer of equipment he intends to use and include cost of this wiring in his bid.
- E. Electrical work shall conform to requirements shown on Drawings. Existing structure shall take precedence over electrical drawings. Because of small scale of electrical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Contractor shall investigate structural and finish conditions and provide such fittings and accessories as may be required to meet such conditions.
- F. Refer to Part 3 Article "Equipment Installation."

1.7 SUBMITTALS

- A. In addition to the requirements in Division 01 Section "Submittal Procedures," comply with the following requirements:
 - 1. Review of product data and shop drawings does not relieve Contractor of responsibility for correct ordering of material and equipment. Submittals shall be reviewed by the Contractor, Engineer and Owner.
 - 2. Include all significant data on submittals shown in specifications and on equipment schedules.
 - 3. Contractor review should ensure that equipment will fit into available space.
 - 4. Submit submittals in brochure form and include all related equipment in one brochure.
 - 5. Submit six copies more than Contractor needs for his use.
 - 6. After award of contract, submit within 30 days.
 - 7. See individual product Sections for submittal requirements.
 - 8. Contractor to affix his company name (in form of a stamp) and project name to all Shop Drawings and submittals before submitting.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. In addition to the requirements in Division 01 Section "Operation and Maintenance Data," comply with the following:
 - 1. Contractor shall submit prior to 50 percent job completion four maintenance manuals. Manuals are to indicate all information relative to maintenance and operating instructions for all new electrical equipment.

2. Operations and Maintenance (O&M) manuals shall be provided for each item of equipment. O&M submittals shall be submitted in expandable 3-ring binders. Binders shall contain a sufficient number of dividers to permit an orderly filing of submittals. Each divider shall be labeled as to contents. O&M submittals shall include but not be limited to the following:
 - a. Installation instructions and schematic drawings.
 - b. Operating and maintenance instructions.
 - c. Complete parts list with manufacturer's model numbers.
 - d. Complete set of approved shop drawings.
 - e. Complete wiring diagrams showing all connections and internal wiring diagrams of all equipment, including module diagrams. Factory typical wiring diagrams are not acceptable.
3. Also, as part of maintenance manuals, furnish a list of all motors used on the project with the following information: equipment served, manufacturer, horsepower, full load nameplate amps, voltage at motor, actual amp draw at full load, fuse size, overload size, type and size of starters, where fed from and how controlled.

1.9 PERMITS

- A. Contractor shall pay for all permits required to carry out his work.
- B. Permits shall be posted in prominent place at building site, protected properly from weather and physical damage.

1.10 MINOR DEVIATIONS

- A. For purpose of clarity and legibility, Drawings are diagrammatic, although size and location of equipment and piping are drawn to scale wherever possible. Verify contract document information at site.
- B. Drawings may indicate required sizes and points of termination and suggested routes. The Drawings do not indicate all necessary offsets. Install work in manner to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear. Do not scale from Drawings.

1.11 RECORD DRAWINGS (AS-BUILTS)

- A. In addition to the requirements in Division 01 Section "Project Record Documents," comply with the following:
 1. During construction, maintain complete and legible set of Drawings, showing changes and deviations between actual construction and Engineer's Drawings. Submit marked-up sets to Engineer for review.
 2. As-Built Drawings shall show ALL conduit routings, junction boxes and wiring.

1.12 PROJECT CLOSEOUT

- A. In addition to the requirements in Division 01 Section "Closeout Procedures," comply with the following:
 1. Contractor shall perform the following at time the building is determined to be complete and ready to turn over to Owner:

- a. All burned out or inoperative lighting lamps and ballasts shall be replaced with new lamps or ballasts by this contractor.
- b. All equipment and systems shall be checked by respective contractor for correct adjustment and operation and made to function as intended.
- c. All moving parts shall be lubricated, and all oil reservoirs and grease cups filled.
- d. All temporary wiring, conduit, etc., shall be removed by respective contractors.

1.13 GUARANTEE

- A. Unless noted otherwise, materials and equipment (excluding lamps) shall be guaranteed for a period of one year after final acceptance of Project by Owner.
- B. Contractor agrees to make good damage to construction of building or site, or equipment which, in the opinion of the Architect/Engineer, is a result of, or incidental to, use of materials, equipment or workmanship which is inferior, defective or not in accordance with the Specifications.
- C. Contractor shall keep Work in good repair during the guarantee period. In case such repairs become necessary, Owner shall give written notice to Contractor to commence such repairs. If after 30 days the Contractor has failed to make such repairs, the Owner may make such repairs either by its own employees or by independent contract and may thereupon recover from Contractor and his Sureties the cost of repairs so made, together with the cost of supervision and inspection thereof. Owner shall have 60 days after expiration of said guarantee period in which to notify Contractor of any such repairs necessary.
- D. Determination of the necessity for repairs shall rest entirely with the Architect/Engineer whose decision upon matter shall be final and obligatory upon the Contractor. Guarantee herein stipulated shall extend to whole body improvement and all its appurtenances.
- E. Include the guarantee in the Operation and Maintenance Manual.

1.14 INSPECTION

- A. At the completion of the electrical installation, the electrical contractor shall notify the local and state authorities to arrange the final inspection of Work. Include the inspection certificate in the Operation and Maintenance Manual.

PART 2 - PRODUCTS

2.1 ASSIGNMENT OF MISCELLANEOUS WORK

- A. Excavating and backfilling for electrical work shall be by electrical contractor.
 - 1. Properly support banks of excavation with safety sheet pile. Install necessary guards. Provide adequate pumping equipment and keep excavation free of water.
 - 2. Excavate pipe trenches to proper depth. Where rock is encountered, excavate to 6 inches below pipe and refill to 6 inches above pipe with compacted granular fill. Granular fill shall consist of dune sand, gravel or other suitable material containing not more than 10 percent by weight passing #200 sieve and 100 percent passing 1-inch sieve.
 - 3. Excavation for utilities shall not be backfilled until all required tests are performed and approved by Engineer and the utility company.

4. Whenever underground feeders are run below footings and grade beams, contractor shall backfill the void with poured, steel-reinforced concrete to elevation of bottom of footing or grade beam.
 5. Backfill within building lines shall be made with granular fill or compacted backfill material laid in 6-inch layers and tamped to specified compaction after each layer.
 6. Backfill under paved area shall be made with granular fill compacted backfill material laid in 12-inch layers and tamped to compaction after each layer.
 7. Backfill under open yards or fields shall be made with non-compacted backfill laid in layers not to exceed 24 inches deep. Sand trenches may be allowed to settle naturally and shall be refilled back to grade as required during first year after final acceptance.
 8. Contractor shall refill, regrade and refinish any area that becomes unsatisfactory due to settlement within one year after final acceptance.
 9. Contractor shall verify all existing grades, inverts, utilities, obstacles and topographical conditions prior to any trenching, excavation or underground installation. In event existing conditions are such as to prevent installation in accordance with Drawings, contractor shall immediately notify Engineer.
 10. Provide appropriate plastic marker tape buried directly above underground electric and communication lines continuously along length of lines. Marker tape shall be located 12 inches below finished grade, but no closer than 12 inches above underground lines. Tape shall be a minimum of 6 inches wide.
 11. Refer to Division 31 Section "Earth Moving," for additional requirements. In event of conflict between this section and Division 31 Section "Earth Moving," Division 31 Section "Earth Moving" shall apply, unless otherwise indicated by Engineer.
- B. Roof openings and flashing required by electrical contractor shall be the responsibility of the electrical contractor; however, all roofing work shall be performed by the roofing contractor. Electrical contractor is responsible for correct size and location of openings. Counterflashing shall be provided by the electrical contractor.
1. Coordinate exact roofing material and approved penetrations with the general contractor prior to the installation of penetrations. Provide components and installation as specified below or as directed by the general contractor.
 2. Conduit Roof Penetration Curb:
 - a. Curb shall be pre-fabricated pipe portal type with molded cover from ABS plastic with laminated acrylic coating. Rubber seal cap to accommodate pipe sizes listed on drawings. Seal cap shall be compression molded of EPDM rubber with high resistance to both ozone and ultra violet sun rays. Fasteners shall be stainless steel snaplock swivel action clamps and shall fasten pipe molded cover to form a water tight seal.
 - b. Conduit roof penetrations may be grouped with other electrical conduits, HVAC piping, and plumbing piping where penetrations of roof are located in the same area. Coordinate other trade penetrations with the mechanical contractor and the plumbing contractor.
 - c. Where electrical equipment is to be installed on the roof to serve rooftop units, condensing units, or other equipment, provide the following:
 - 1) The electrical contractor shall provide supports constructed of minimum 1-inch rigid conduit, bolted or welded to roof structural system, extending through roof pre-fabricated curb and permanently attached to electrical equipment. Install electrical equipment 1'-6" above roof to bottom of equipment unless otherwise noted.
 - 2) Manufacturer: Subject to compliance with above requirements, provide pipe roof penetration curb from one of the following: Pate Curb Co.; Roof Products and System Corporation.

- C. Concrete pads and bases for electrical work shall be formed and poured by the electrical contractor. Electrical contractor shall install all anchoring devices.
 - 1. Unless noted otherwise, 4-inch pads projecting 3 inches on all sides beyond equipment shall be used for switchboards, control centers, unit substations, motor controllers, etc. Set bolts in pipe sleeves from templates or actual measurements. Set equipment level and grout in place. Anchor equipment to pad.
 - 2. Concrete used on this project shall have maximum slump of 4 inches and shall attain 3000 psi compressive strength after 28 days. Smooth out all rough edges and surfaces.
- D. Platforms and supporting stands for electrical equipment shall be furnished by the electrical contractor.
 - 1. Each piece of equipment or apparatus suspended from ceiling or mounted above floor level shall be provided with suitable structural support, platform or carrier, in accordance with best recognized practice.
 - 2. Contractor shall exercise extreme care that structural members of building are not overloaded by such equipment. In all cases, details of such hangers, platforms and supports, together with total weight of mounted equipment, shall be approved by Engineer.
- E. Cutting and patching for electrical equipment shall be by the electrical contractor.
 - 1. Cut structural materials where required after approval from Architect/Engineer.
 - 2. Electrical contractor shall provide all his own cutting and patching in finished areas.
- F. Ceiling and wall access panels for electrical equipment shall be furnished and installed by the electrical contractor.
 - 1. Wherever any electrical outlet, junction box, or item of equipment is concealed or enclosed above or behind walls, ceilings, floors, bulkheads, etc., an access panel or door shall be provided.
 - 2. When access through acoustic tile ceiling is required, this shall be accomplished wherever possible by use of removable ceiling tiles.
 - 3. All access panels, doors and removable ceiling tiles required for electrical equipment shall be provided and installed by contractor as required and as approved by Engineer.
 - 4. Access panels or doors shall be of design suitable to type of construction at each location. Locks shall be flush, screw driver-operated, cam action type. Doors and frames shall be furnished in prime coat of gray, rust-inhibitive paint unless otherwise specified. These units shall be manufactured by Milcor or approved equal.
- G. Lintels required by the electrical contractor shall be furnished by the electrical contractor. Electrical contractor shall notify the general contractor of correct location for all lintels prior to wall construction.
- H. Sleeves and small openings (not framed) for electrical equipment shall be furnished and set by electrical contractor.
 - 1. Where electrical conduits pass through walls, roofs, ceilings, or floors, electrical contractor shall have sleeves set for them when floors, walls, ceilings or roofs are constructed. If any holes are cut in finished work where sleeves have been omitted, cutting shall be done with a concrete coring machine or other approved means and only with consent of Engineer. All such holes are to be carefully cut and shall not be larger than necessary. These holes are to be entirely covered by escutcheon plates when work is completed. Sleeves shall be made of pipe or rolled sheet steel no lighter than No. 18 gauge.

2. Where conduits pass through sleeves in exterior walls above grade, annular space shall be caulked with oakum and filled inside and out with non-hardening, waterproof sealant finished off flush with both faces of wall.
3. Provide penetration seals for all conduits penetrating the building wall below grade. This shall include service entrance, site power and lighting circuits, etc.
 - a. Description: The pipe to wall penetration closures shall be "Link-Seal" or equal, as manufactured by PSI/Thunderline Corporation – Houston, TX. Seals shall be modular type, consisting of synthetic rubber shaped to continuously fill the annular space between the pipe and wall opening. After the seal assembly is positioned in the sleeve, the rubber sealing elements shall provide an absolutely water-right seal between the pipe and wall opening. The seal shall be constructed as to provide electrical insulation between the pipe and wall, thus reducing changes of cathodic reaction between these two members.
 - b. Wall Opening: Provide "Century-Line" sleeves or equal as manufactured by PSI/Thunderline Corporation – Houston, TX. Contractor shall determine the required inside diameter of each individual wall opening of sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water-tight joint. Sizing (correct Link-Seal model and number of links per seal) may be obtained through manufacturer's catalog. If pipe O.D is non-standard due to coating, insulation, etc. consult Thunderline's factory for engineering assistance and recommendation before proceeding with wall opening detail.
- I. Holes through Structural members: Holes required for conduit of size 5-inches and smaller shall be cut in field at expense of electrical contractor. Obtain structural engineer's approval in writing prior to any cutting.
- J. Pitch Pockets: Required for conduit penetrating roof by electrical contractor. Electrical contractor to seal sleeves and provide flashing.
- K. Color Coding: Responsibility for correct color coding shall be by the electrical contractor.
- L. Dust Protection: Temporary partitions or barriers required to protect existing building or facility shall be provided by electrical contractor. Electrical contractor shall coordinate necessity and location of such protection with Owner.
- M. Painting of electrical equipment, conduits, etc., shall be in accordance with painting part of the Specification. Painting shall be by others, except as indicated below, who will paint work of electrical contractor; however, each contractor shall thoroughly clean all his own equipment, apparatus and piping in manner satisfactory to Architect and Owner. Equipment furnished with factory applied finish shall be protected from injury and any damaged surface shall be repaired by electrical contractor to match original finish or shall be replaced before final acceptance. The electrical contractor shall provide color-code painting as required to comply with Division 26 Section "Identification for Electrical System."

2.2 MATERIALS AND EQUIPMENT

- A. Electrical equipment shall be new, listed by UL and shall conform to NEMA and ICEA standards.
- B. Materials used for like service shall be by same manufacturer (i.e., all motor starters to be by same manufacturer).

- C. All materials and equipment, including any hangers, supports, fastenings or accessory fittings, shall have corrosion protection suitable for atmosphere in which they are installed, whether located indoors or out. Care shall be taken during installation to assure integrity of corrosion protection.
- D. All screws, bolts, nuts, clamps, fittings or other fastening devices shall be made up tight. All bolts, screws, nuts and other threaded devices shall have standard threads and heads so they may be installed and replaced when necessary without special tools.

2.3 PRODUCT AND MATERIAL APPROVAL

- A. A Specification followed by one or more manufacturers is limited to those manufacturers. Names of other manufacturers may be submitted for approval to Engineer a minimum of ten (10) days prior to receiving bids. Approval will be issued by Addendum if granted.
- B. A Specification followed by one or more manufacturers and "or approved equal" is open to all equal products or materials; however, Contractor shall supply one of listed manufacturers at no additional cost if Engineer finds substituted product unsatisfactory.

2.4 EQUIPMENT DELIVERY SCHEDULE

- A. Submit upon request a schedule listing equipment and materials required for complete installation, quantity ordered, date of placing order and promised delivery date.

2.5 MATERIAL STORAGE

- A. Provide suitable protection from weather and vandalism for all materials and equipment to be installed. Storage shall be dry, clean and safe. Any materials or equipment damaged, deteriorated, rusted or defaced due to improper storage shall be fully repaired, refinished or replaced as directed by Engineer.

2.6 TEMPORARY USE OF EQUIPMENT

- A. Should it become necessary or desirable to operate any equipment before final acceptance, Owner shall be allowed to do so, but only after proper adjustment and trial operation by contractor specified. Electrical contractor shall be responsible for instructing Owner or his Representative as to proper operation and care of equipment so used. Owner shall be responsible for proper care and supervision of equipment before acceptance and shall safeguard same in every way.

2.7 CAULKING AND FIRESTOPPING

- A. In addition to the requirements in Division 07 Section "Penetration Firestopping," comply with this Article.
- B. All raceway and sleeve penetrations of fire barriers shall be sealed to achieve fire resistance equivalent to fire separation.
 - 1. Maintain fire rating per ASTM E-814 and UL 1479.
 - 2. This assembly must also maintain a watertight seal between floor or wall and pipe.

- C. For other penetrations through non-rated walls, partitions, floors and ceilings, caulk the space between raceways and raceway sleeves with non-staining, waterproof gun grade compound. Apply caulking compound by the gun method using nozzles of a proper size to fit the width of joint. Prepare the joint for caulking by packing it tightly with a resilient foam or rope yarn.
- D. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Penetration sealant:
 - a. 3M Brand "Moldable Putty Pads": and "Moldable Putty Stix"
 - b. 3M Brand "Fire Barrier" Caulk, Putty or Penetrating Sealing Systems
 - c. Dow Corning "Fire Stop Foam: and "Fire Stop Sealant" systems
 - d. Insta-Foam Products, Inc. "Insta-Fire Seal Silicone RTV Foam"
 - e. Standard Oil Engineering Materials Company, "Frye Putty"
 - f. Chase technology "Chase Foam #CTC PR-855"
 - 2. Intumescent Sealant for use at openings and sleeves involving flexible cable.
 - a. 3M Brand "Fire Barrier" caulk or putty, FS-195 Wrap Strip and CS-195 Composite Sheet.
 - b. Dow Corning "Fire Stop Intumescent Wrap Strip"
 - c. Fox Couplings, Inc. "The Fox Cast-in-Place Coupling"
- E. Performance Characteristic: Firestopping materials shall conform to both Flame (F) and Temperature (T) ratings as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test.
 - 1. F Rating shall be a minimum of one hour but not less than the fire resistance rating of the assembly being penetrated.
 - 2. Conduct the fire test with a minimum positive pressure differential of 0.01 inches of water column.
- F. Quality Assurance: Installer qualifications – a firm specializing in firestopping installation with not less than two years of experience or trained and approved by firestopping manufacturer.

PART 3 - EXECUTION

3.1 ATTACHING TO BUILDING CONSTRUCTION

- A. Equipment raceway supports shall be attached to structural members (beams, joists, etc.) rather than to floor or roof slabs. Do not attach to ceiling support wires.
- B. Where equipment and raceway are suspended from existing concrete or masonry construction, use expansion shields to attach supports to construction. Expansion shield bolt diameter shall be same size as support rod diameter, hereinafter specified. Expansion shields shall be Star Double, Star Gloxin, Star Loxin or approved equal.
- C. Where existing masonry is not suitable to receive and hold expansion shield or where other means of attachment is advantageous, Contractor shall submit alternate method for approval by Engineer.
- D. Equipment to be installed in groups shall not be mounted directly to masonry or concrete walls. Mount 1- by 1-inch structural channel such as Unistrut, to wall and secure equipment to these channels.

- E. Where raceways are suspended from structural steel building framing or supporting members, furnish and install beam clamps for attaching piping device to building member.
- F. Obtain approval from Owner and structural engineer before cutting or welding to structural members, or before hanging heavy equipment.

3.2 ELECTRICAL CONNECTIONS TO EQUIPMENT

- A. In event that supplier requires larger starter or disconnect than those indicated on documents, he shall reimburse contractor supplying these items for difference.
- B. Connections and wiring diagrams shown on Drawings or described in Specifications are typical and are for bidding purposes only. Detailed diagrams and instructions shall be provided by contractor supplying equipment if connections are different from those shown on Drawings. Diagrams shall be submitted to Engineer for review prior to actual wiring.
- C. Additional relays, switches, contactors, etc., which may be required for control purposes in addition to those specified for and indicated on Drawings, shall be provided by electrical contractor. These devices shall be mounted by supplier within 5-feet of apparatus to be installed. Electrical contractor shall provide all additional wire and electrical connections without additional charge to Owner.

3.3 ESCUTCHEONS

- A. Install chrome plated escutcheons on exposed bare conduit, leaving and entering walls, floors, ceilings, etc.

3.4 EQUIPMENT INSTALLATION

- A. All equipment must be installed such that maintenance and service may be properly accomplished. If necessary, the Owner, at their option, may require the contractor to demonstrate the service on any piece of equipment to determine sufficient service space exists. If the service space is not adequate, the equipment shall be relocated at no additional cost to the Owner such that sufficient service space is achieved.

3.5 OCCUPATIONAL SAFETY & HEALTH STANDARDS

- A. All work shall comply with current requirements of U.S. Department of Labor-Occupational Safety & Health Administration, entitled Occupational Safety and Health Standards; National Consensus Standards and Established Federal Standards.

3.6 TEMPERATURE CONTROLS AND BUILDING MANAGEMENT SYSTEMS

- A. Electrical contractor shall provide power wiring for temperature control panels and shall coordinate and verify locations and quantities with temperature controls contractor. (No extra will be paid for any panels because electrical contractor did not coordinate with temperature controls contractor.)
- B. The wiring required to connect the electrical control devices and temperature control panels specified in the Mechanical Sections, including wiring for switches, freeze-stats, limit controls, relays, flow and

pressure switches, etc., will be provided under Mechanical Sections. Interlock wiring specified in mechanical Sections shall be provided under mechanical Sections. Electrical contractor shall provide the 120 volts only.

- C. Electrical Contractor shall provide device box and conduit to above accessible ceiling for thermostats and sensors furnished by temperature control contractor or the mechanical contractor.

3.7 ELECTRICAL DEMOLITION

- A. In addition to the requirements in Division 02 Section "Selective Demolition," comply with this Article.
 - 1. Scope of Work: Provide demolition required for removal of systems and equipment made obsolete by this Project and as determined by the Architect/Engineer.
 - 2. Work Included:
 - a. Non-destructive removal of systems, materials, and equipment for reuse or salvage as shown on Drawings or requested by Owner.
 - b. Removal of all debris from site and legal disposal of same.
 - c. Removal of all abandoned or obsolete exposed materials and equipment for a clean and finished installation.
 - d. Removal of all abandoned or obsolete raceways, wiring, cabling, or electrical devices of any kind.
- B. Conditions
 - 1. Coordination: It shall be expected that the Contractor understands that adjacent areas need to remain in operation and that services to these areas need to be maintained. A schedule will be worked out prior to beginning work and as many criteria for operation as possible will be explained. Contractor cooperation shall be expected in all conditions.
 - 2. Phasing:
 - a. Prior to commencing demolition in any area of the work, notify the Owner and Architect/Engineer five (5) working days in advance to insure that no adjacent occupied areas will be disrupted.
 - b. Demolition phasing must be approved by Architect/Engineer prior to commencement of operations.
 - c. Removal of debris and construction traffic will be limited to specified areas. Confirm all operations with Architect/Engineer prior to commencement of work.
 - 3. Adjacent Materials:
 - a. During the execution of the work, primary consideration shall be given to protecting from damaging the structure, furnishings, finishes, and the like which are not specifically indicated to be removed and disposed.
 - b. Provide and maintain temporary partitions or dust barriers adequate to keep dirt, dust, noise and other particles from being transferred to adjacent areas.
 - c. Existing items or surfaces to remain which are damaged as a result of this work shall be refinished, repaired, or replaced to the satisfaction of the Architect/Engineer and Owner at no additional cost.
- C. Materials

1. Patching: Materials used for patching shall be in conformance with the applicable sections of the Project Manual. Where materials are not specifically described but required for proper completion of the work, they shall be as selected by the Contractor subject to approval of the Architect/Engineer. Materials used and workmanship shall match surrounding areas as much as possible, unless otherwise directed.

D. Demolition

1. Site Inspection
 - a. The Contract Documents do not propose to show all systems, materials, or equipment existing on the project that will require demolition.
 - b. Before commencing the work of this Section, verify with the Architect/Engineer and Owner all systems, materials, and equipment to be removed and those to be preserved.
2. Scheduling
 - a. Schedule all work in a careful manner with all necessary considerations for public and adjacent areas.
 - b. Avoid interference with the use of adjacent areas and passage to and from these areas.
3. Abandoned Materials and Equipment: Items so indicated on Contract Documents to be removed and not indicated or specified to be saved or retained, shall be demolished, removed, demounted, or disconnected in the best possible manner to ensure that no damage will result to other adjacent items or surfaces to remain.
4. Salvage
 - a. During removal of items so indicated, caution shall be used to eliminate damage to any equipment having salvage value.
 - b. All reusable salvaged material shall remain the property of the Owner and be retained for his inspection. Only items so inspected and rejected by the Owner shall be disposed by the Contractor. All other such items shall be turned over and deposited as directed by the Owner.
5. Disposal and Clean Up
 - a. Areas in which demolition and salvage work is being done shall be cleaned daily.
 - b. Dirt, dust, debris, unsalvageable and reusable items, and the like shall be totally removed from the project site daily. Under no circumstances shall such refuse be allowed to collect for longer periods.
 - c. Refuse shall not be allowed to block, or otherwise impair, circulation in corridors, stairs, sidewalks, or other traffic areas.
6. Existing Facilities
 - a. Where existing equipment or materials are removed or changed, all branch conduits, which no longer are in service, shall be removed as directed by Engineer. If, in course of work, outlets are covered up, or otherwise rendered inaccessible, all wiring to same shall be removed to source. If circuit that must remain in service is interrupted, it shall be reconnected by most inconspicuous means so as to remain operational, with same capacity as before. All building surfaces damaged and openings left by removal of boxes, piping and

other equipment shall be repaired by Contractor. Holes left in junction boxes, switches, panels, etc. shall be closed.

- b. Where new openings are cut and concealed conduits, wiring, etc. are encountered, they shall be removed or relocated as required. Where conduit to be removed stubs through floors, walls and ceilings, such conduit shall be removed to a point where finish surfaces can be patched adequately so that no evidence of former installation remains. Patching and refinishing required shall be responsibility of Contractor.

END OF SECTION 260500

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SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2 and Type SO.
- C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC and Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper.
- B. Branch Circuits: Copper.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, or single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-2-THWN-2, single conductors in raceway.
- F. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway (or metal-clad cable, Type MC only allowed for "fishing" in existing walls).
- H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conduit Fill: Unless otherwise indicated, install no more than the following in a single conduit or EMT:
 - 1. Single-Phase Circuits: Three circuits, phases A, B, and C, and associated grounded (neutral) conductors, and equipment grounding conductor.
 - 2. Three-Phase Circuits: One circuit, phases A, B, and C, and grounded conductor where applicable, and equipment grounding conductor.
- B. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- C. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

- D. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- G. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.

3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. ERICO International Corporation.
 - 3. Harger Lightning and Grounding.
 - 4. ILSCO.
 - 5. O-Z/Gedney; A Brand of the EGS Electrical Group.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Uninsulated Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install uninsulated tinned-copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

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SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

- A. Product Data: For steel slotted support systems.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Not permitted.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc. a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Steel Slotted Support Systems: Select material suitable for environmental conditions.
 1. Outdoors: Metallic coated.
 2. Corrosive Locations (Swimming Pools, Dishwashing): Nonmetallic coated.
 3. Indoors: Painted.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. To Existing Concrete: Expansion anchor fasteners.
 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. IMC: Comply with ANSI C80.6 and UL 1242.
- D. EMT: Comply with ANSI C80.3 and UL 797.
- E. FMC: Comply with UL 1; zinc-coated steel.
- F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
 - a. Material: Steel. Die-cast is not permitted.
 - b. Type: Setscrew or compression.

- H. Joint Compound for IMC and GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC and Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. Continuous HDPE: Comply with UL 651B.
- D. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- E. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Metal Floor Boxes:
 1. Material: Cast metal or sheet metal.

2. Type: Fully adjustable or semi-adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Nonmetallic Floor Boxes: Nonadjustable, round or rectangular as indicated.
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
1. Listing and labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum or galvanized, cast iron with gasketed cover.
- K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- L. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- M. Gangable boxes are prohibited.
- N. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic or fiberglass.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- O. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.
 - 3. Underground Conduit: RNC, Type EPC-80-PVC, direct-buried.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC maximum 6-foot length.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed and Subject to Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Electrical rooms.
 - e. Utility tunnels.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Concealed in Exterior Walls: RNC, Type EPC-40-PVC.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations, maximum 6-foot length.
 - 6. Damp or Wet Locations: GRC or IMC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. EMT: Use steel fittings. Comply with NEMA FB 2.10.
 - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum boxes or fittings in contact with concrete or earth.
- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and below floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Raceways Embedded in Slabs: Not permitted.
- I. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- M. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- N. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.

- O. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- P. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- Q. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- R. Locate boxes so that cover or plate will not span different building finishes.
- S. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- T. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- U. Set metal floor boxes level and flush with finished floor surface.
- V. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill.
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
 - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 - 5. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

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SECTION 260544 – SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Sleeve-seal fittings.
 - 4. Grout.
 - 5. Silicone sealants.
- B. Related Requirements:
 - 1. Division 07 Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.

- b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. GPT Industries.
 - d. Metraflex Company (The).
 - e. Pipeline Seal and Insulator, Inc.
 - f. Proco Products, Inc.
 - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Reinforced nylon polymer.
 - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 92 00 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Identification for conductors.
 - 2. Underground-line warning tape.
 - 3. Warning labels and signs.
 - 4. Instruction signs.
 - 5. Equipment identification labels.
 - 6. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
 - b. Overall Thickness: 5 mils.
 - c. Foil Core Thickness: 0.35 mil.
 - d. Weight: 28 lb./1000 sq. ft.
 - e. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Screw-attached, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
 - 1. Self-Adhesive equipment identification labels are not permitted.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- D. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- E. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coded conductor insulation to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Common Neutral: White.

- 5) Neutral, Phase A: White with black stripe.
 - 6) Neutral, Phase B: White with red stripe.
 - 7) Neutral, Phase C: White with blue stripe.
 - 8) Equipment Grounding Conductor: Green.
- c. Colors for 480/277-V Circuits:
- 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Common Neutral: Gray.
 - 5) Neutral, Phase A: Gray with brown stripe.
 - 6) Neutral, Phase B: Gray with orange stripe.
 - 7) Neutral, Phase C: Gray with yellow stripe.
 - 8) Equipment Grounding Conductor: Green.
- d. Field-Applied, Color-Coding Conductor Tape: Not permitted.
- B. Install instructional sign including color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- C. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.

- H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- I. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Stenciled legend 4 inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

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SECTION 260923 – LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Electronic time switches.
 - 2. Electromechanical dial-time switches.
 - 3. Photoelectric switches.
 - 4. Indoor occupancy sensors.
 - 5. Switchbox-mounted occupancy sensors.
 - 6. Outdoor motion sensors.
 - 7. Room controllers.
 - 8. Lighting contactors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Show installation details for the following:
 - a. Occupancy sensors
 - b. Room Controllers
 - 2. Interconnection diagrams showing field-installed wiring.
 - 3. Include diagrams for power, signal and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ELECTRONIC TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Industries, Inc.
 - 2. Intermatic, Inc.
 - 3. Invensys Controls.
 - 4. Leviton Manufacturing Co., Inc.
 - 5. NSi Industries LLC; TORK Products.
 - 6. TE Connectivity Ltd.

- B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
 - 1. Listed and labeled as defined in NFPA 70 and marked for intended location and application.
 - 2. Contact Configuration: SPST.
 - 3. Contact Rating: 40-A inductive or resistive, 120/277-V ac.
 - 4. Programs:
 - a. Two on-off set points on a 24-hour schedule, allowing different set points for weekdays and weekends, with astronomic time function.
 - 1) On at sunset; off at Owner specified curfew.
 - 2) On at Owner specified on-time; off at sunrise.
 - 5. Automatic daylight savings time changeover.
 - 6. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.
 - 7. Enclosure: Metal, indoor/outdoor.

2.2 ELECTROMECHANICAL DIAL-TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Industries, Inc.
 - 2. Intermatic, Inc.
 - 3. Invensys Controls.
 - 4. Leviton Manufacturing Co., Inc.
 - 5. NSi Industries LLC; TORK Products.
 - 6. TE Connectivity Ltd.
- B. Electromechanical-Dial Time Switches: Comply with UL 917.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Contact Configuration: SPST.
 - 3. Contact Rating: 30-A inductive or resistive, 120/277-V ac.
 - 4. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.
 - 5. Enclosure: Metal, indoor/outdoor.

2.3 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Industries, Inc.
 - 2. Intermatic, Inc.
 - 3. NSi Industries LLC; TORK Products.
 - 4. Tyco Electronics; ALR Brand.
- B. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.4 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Industries, Inc.
 2. Hubbell Building Automation, Inc.
 3. Intermatic, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lithonia Lighting; Acuity Lighting Group, Inc.
 6. Lutron Electronics Co., Inc.
 7. Sensor Switch, Inc.
 8. Watt Stopper.
- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack. Provide optional dry contacts for interface to Building Automation Systems, where required by Division 23 for control of equipment.
 4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 7. Bypass Switch: Override the "on" function in case of sensor failure.
 8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.
1. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..

2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.
- D. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch- high ceiling.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch- high ceiling.
 5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot- high ceiling in a corridor not wider than 14 feet.
- E. Multi-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.5 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Industries, Inc.
 2. Hubbell Building Automation, Inc.
 3. Intermatic, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lithonia Lighting; Acuity Lighting Group, Inc.
 6. Lutron Electronics Co., Inc.
 7. Sensor Switch, Inc.
 8. Watt Stopper.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.

3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
- C. Wall-Switch Sensor:
 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft.
 2. Sensing Technology: PIR.
 3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
 4. Voltage: Dual voltage, 120 and 277 V type.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.6 ROOM CONTROLLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hubbell Building Automation, Inc.
 2. Leviton Mfg. Company Inc.
 3. Watt Stopper.
- B. System Description: Sensing occupancy, the system adjusts the indoor electrical lighting levels.
 1. General lighting control set point is based on lighting conditions:
 - a. When no occupancy is present, dim to 20 percent output.
 - b. When occupancy is present, full output.
 - c. When room switch is off, general lighting is off
 2. Night Light (NL) control set point is based on lighting conductions
 - a. When no occupancy is present, dim to 20 percent output.
 - b. When occupancy is present, full output.
 - c. When room switch is off, night lighting is on 20 percent output.
- C. Electrical Components, Devices and Accessories:
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Sensor Output: 0- to 10-V dc to operate luminaires. Sensor is powered by controller unit.
- D. Description: Six scene digital controller capable of accepting three (3) RJ45 inputs with two (2) outputs rated for 20-A LED load at 120- and 277-V ac. Sensor has 24-V dc Class 2 power source, as defined by NFPA 70. Controls 0- to 10-V dc dimming drivers.

2.7 OUTDOOR MOTION SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Industries, Inc.
 2. Hubbell Building Automation, Inc.
 3. Intermatic, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lithonia Lighting; Acuity Lighting Group, Inc.
 6. NSI Industries LLC; TORK Products.
 7. RAB Lighting.
 8. Sensor Switch, Inc.
 9. Watt Stopper.
- B. General Requirements for Sensors: Solid-state outdoor motion sensors.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. PIR type, weatherproof. Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. Comply with UL 773A.
 3. Switch Rating:
 - a. Lighting-Fixture-Mounted Sensor: 1000-W incandescent, 500-VA fluorescent.
 - b. Separately Mounted Sensor: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 4. Switch Type: SP, dual circuit.
 5. Voltage: Dual voltage, 120- and 277-V type.
 6. Detector Coverage:
 - a. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft.
 - b. Long Range: 180-degree field of view and 110-foot detection range.
 7. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 8. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 9. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
 10. Operating Ambient Conditions: Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F, rated as "raintight" according to UL 773A.

2.8 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allen-Bradley/Rockwell Automation.
 2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 3. Eaton Corporation.
 4. General Electric Company; GE Consumer & Industrial – Electrical Distribution; Total Lighting Control.

5. Square D; a brand of Schneider Electric.
- B. Description: Electrically operated and mechanically or electrically held as indicated on Drawings, combination-type lighting contactors with, complying with NEMA ICS 2 and UL 508.
 1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.9 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- B. Sensor Spacing:
 1. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 2. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
- C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
- D. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

- E. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch.
- F. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Engage a factory-authorized service representative to test and inspect components, assemblies and equipment installations, including connections of room controllers.

3.3 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two (2) visits to Project during other normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time-delay to suit Owner's operations.
 - 2. For room controllers, adjust set points and deadband controls to suit Owner's operations.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate and maintain lighting control devices.

END OF SECTION 260923

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 6. Include wiring diagrams for power, signal, and control wiring.
 - 7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Panelboard schedules for installation in panelboards.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to replace items that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.

- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Flush- and surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box with continuous piano hinge and standard door within hinged trim cover.
 - 4. Directory Card: Inside panelboard door, mounted in card holder with metal frame and transparent plastic window.
- B. Incoming Mains Location: Top and bottom.
- C. Phase, Neutral, and Ground Buses: Tin-plated aluminum or hard-drawn copper, 98 percent conductivity.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Tin-plated aluminum or hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Compression or mechanical type.
 - 3. Ground Lugs and Bus Configured Terminators: Compression or mechanical type.
 - 4. Feed-Through Lugs: Compression or mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Sub-feed (Double) Lugs: Compression or mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.
 - 1. Series-ratings are not permitted.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Mains: Circuit breaker, fused switch, or lugs only, as indicated on Drawings.
- D. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- E. Branch Overcurrent Protective Devices: Fused switches.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only, as indicated in Drawings.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Compression or mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
 - f. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - g. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
 1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Section 26 28 13 "Fuses."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407.
- B. Mount top of trim 79 inches above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Install overcurrent protective devices and controllers not already factory installed.
 1. Set field-adjustable, circuit-breaker trip ranges.

- E. Install filler plates in unused spaces.
- F. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- H. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

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SECTION 262726 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. USB charger devices.
 - 3. Weather-resistant receptacles.
 - 4. Snap switches and wall-box dimmers.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Arrow Hart/Eaton (Arrow Hart).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, One -piece solid brass mounting strap. 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; 5361 (single), AH5362 (duplex).
 - b. Hubbell; HBL5361 (single), HBL5362 (duplex).
 - c. Leviton; 5891 (single), 5362 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362-A (duplex).
- B. Tamper-Resistant Convenience Receptacles, One-piece solid brass mounting strap. 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; AHTR5362.
 - b. Hubbell; HBL5362TR.
 - c. Leviton; 5362-SG.
 - d. Pass & Seymour; TR63.

2.4 USB CHARGER DEVICES

- A. Tamper-Resistant, USB Charger Receptacles: 5 V dc, 3.1 A, USB Type A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1310, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; TR7756.
 - b. Hubbell; USB20X2.
 - c. Leviton; T5832.
 - d. Pass & Seymour; TR5362USB.
 - 2. USB Receptacles: Two, Type A.
 - 3. Line Voltage Receptacles: Two, two pole, three wire, and self-grounding.
- B. Tamper-Resistant, Hospital Grade, USB Charger Receptacles: 5 V dc, 3.1 A, USB Type A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1310, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; TR8355.
 - b. Hubbell; USB8300.

- c. Leviton; T5832-HG.
 - d. Pass & Seymour; TR8300HUSB.
- 2. USB Receptacles: Two, Type A.
 - 3. Line Voltage Receptacles: Two, two pole, three wire, and self-grounding.
 - 4. Description: Labeled shall comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.5 GFCI RECEPTACLES

A. General Description:

- 1. Straight blade, feed-through type.
- 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943 Class A.
- 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; SGF20.
 - b. Hubbell; GFRST20.
 - c. Pass & Seymour; 2097.
 - d. Leviton; GFNT2-.

C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; TRSGF20.
 - b. Hubbell; GFTRST20.
 - c. Pass & Seymour; 2097TR.
 - d. Leviton; GFTR2-.

D. Weather-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; WRSGF20.
 - b. Hubbell; GFWRST20.
 - c. Pass & Seymour; 2097TRWR.
 - d. Leviton; GFWR2-.

E. Weather- and Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; TWRSGF20.
 - b. Hubbell; GFTWRST20.
 - c. Pass & Seymour; 2097TRWR.
 - d. Leviton; GFWT2-.

2.6 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; CWL520R.
 - b. Hubbell; HBL2310.
 - c. Leviton; 2310.
 - d. Pass & Seymour; L520-R.

2.7 PENDANT CORD-CONNECTOR DEVICES

- A. Description:
1. Matching, locking-type plug and receptacle body connector.
 2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
 3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
 4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.8 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Single Pole:
 - 1) Arrow Hart; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) Pass & Seymour; PS20AC1.
 - b. Two Pole:
 - 1) Arrow Hart; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) Pass & Seymour; PS20AC2.
 - c. Three Way:
 - 1) Arrow Hart; AH1223.
 - 2) Hubbell; HBL1223.
 - 3) Leviton; 1223-2.
 - 4) Pass & Seymour; PS20AC3.

- d. Four Way:
 - 1) Arrow Hart; AH1224.
 - 2) Hubbell; HBL1224.
 - 3) Leviton; 1224-2.
 - 4) Pass & Seymour; PS20AC4.
- C. Pilot-Light Switches, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; AH1221PL for 120 and 277 V.
 - b. Hubbell; HBL1221PL for 120 and 277 V.
 - c. Leviton; 1221-PLR for 120 V; 1221-7PR for 277 V.
 - d. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.
 - 2. Description: Single pole, with red neon-lighted handle, illuminated when switch is "on."
- D. Lighted-Handle Switches, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; AH1221LT for 120 and 277 V.
 - b. Hubbell; HBL1221IL for 120 and 277 V.
 - c. Leviton; 1221-LH for 120 V; 1221-7L for 277 V.
 - d. Pass & Seymour; PS20AC1ISL for 120 and 277 V.
 - 2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."
- E. Key-Operated Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; AH1221L.
 - b. Hubbell; HBL1221L.
 - c. Leviton; 1221-2L.
 - d. Pass & Seymour; PS20AC1-L.
 - 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- F. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; 1995.
 - b. Hubbell; HBL1557.
 - c. Leviton; 1257.
 - d. Pass & Seymour; 1251.
- G. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Arrow Hart; 1995L.
- b. Hubbell; HBL1557L.
- c. Leviton; 1257L.
- d. Pass & Seymour; 1251L.

2.9 SPRING-WOUND INTERVAL TIME SWITCHES

- A. Spring-Wound Countdown Timer: Single-pole, single-throw, 125-277 V ac, rated 20 A at 125 V ac and 10 A at 277 V ac, without hold function.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Intermatic model FF2H.

2.10 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Cooper Wiring Devices; Skye series.
- b. Leviton, Renoir II series.
- c. Lutron, Nova T series.
- d. Pass & Seymour; Titan series.
- e. Philips, Sunrise series.

- B. Control: Continuously adjustable slider; with single-pole or three-way preset switching. Comply with UL 1472.

- C. Incandescent Lamp Dimmers: 120 V; forward and reverse phase cut control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

1. 600 W; dimmers shall require no derating when ganged with other devices.

- D. Fluorescent Lamp Dimmer Switches: Rated 8 A at 120 V and 5 A at 277 V, 0-10 V dc control, modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 10 percent of full brightness.

- E. LED Lamp Dimmer Switches: Rated 8 A at 120 V and 5 A at 277 V, 0-10 V dc control, modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 10 percent of full brightness.

2.11 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, extra-duty, while-in-use, die-cast aluminum with lockable cover.

2.12 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, and flap-type, and above-floor, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular and round, die-cast aluminum and solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.13 POKE-THROUGH ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Hubbell Incorporated; Wiring Device-Kellems.
 2. Wiremold/Legrand.
- B. Description:
1. Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
 2. Comply with UL 514 scrub water exclusion requirements.
 3. Service-Outlet Assembly: Flush type with four simplex receptacles and space for four RJ-45 jacks complying with requirements in Section 271500 "Communications Horizontal Cabling."
 4. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
 5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 6. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
 7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables that comply with requirements in Section 271500 "Communications Horizontal Cabling."

2.14 FINISHES

- A. Device Color:
1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Power System: Red.

- B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
 - 10. Install adjacent devices in multi-gang boxes under common device plates.

- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
 - 1. Install dimmers within terms of their listing.
 - 2. Verify that dimmers used for fan speed control are listed for that application.
 - 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Adjust locations of floor service outlets, poke-through assemblies, and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 262726

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SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cartridge fuses rated 600-V ac and less and spare fuse cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA FU 1 for cartridge fuses.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Littelfuse, Inc.
 - 4. Mersen.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 SPARE FUSE CABINETS

- A. Cabinet: Wall-mounted, 0.05-inch-thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 - 2. Finish: Gray, baked enamel.
 - 3. Identification: "SPARE FUSES" in 1-1/2-inch-high letters on exterior of door.
 - 4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

- A. Service Entrance: Class L, time delay.
- B. Feeders, 600 A or Less: Class J, time delay.
- C. Feeders, 601 A or Greater: Class L, time delay.
- D. Motor Branch Circuits: Class RK1, time delay.
- E. Other Branch Circuits: Class J, time delay.
- F. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install spare-fuse cabinet.

3.3 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 262813

SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Fusible box cover switches.
 - 4. Molded-case circuit breakers (MCCBs).
 - 5. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 4. Lugs: Suitable for number, size, and conductor material.
 5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120 V(ac).
 6. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Lugs: Suitable for number, size, and conductor material.
 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120 V(ac).

2.3 FUSIBLE BOX COVER SWITCHES

- A. Manufacturers:
1. Cooper Bussman, Inc.
 2. Ferraz Shawmut, Inc.
 3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

- B. Description: Box cover units for standard electrical boxes with fused switch protection, Type S dual-element fuse and holder, rated 1/2 horsepower, and single-pole snap switch.

2.4 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- E. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.5 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

SECTION 262913 – ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following enclosed controllers rated 600 V and less:
 - 1. Full-voltage manual.
 - 2. Full-voltage magnetic.

1.2 DEFINITIONS

- A. CPT: Control power transformer.
- B. N.C.: Normally closed.
- C. N.O.: Normally open.
- D. OCPD: Overcurrent protective device.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed controller.
- B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

- A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
- B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 - 2. Configuration: Nonreversing, reversing, or two speed as indicated on Drawings.
 - 3. Surface mounting.
 - 4. Pilot light.
- C. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 - 2. Configuration: Nonreversing, or two speed as indicated on Drawings.
 - 3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type or melting alloy type.
 - 4. Surface mounting.
 - 5. Pilot light.
- D. Integral Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.

2. Configuration: Nonreversing, reversing, or two speed as indicated on Drawings.
 3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters and sensors in each phase, matched to nameplate full-load current of actual protected motor and having appropriate adjustment for duty cycle; external reset push button; bimetallic type or melting alloy type.
 4. Surface mounting.
 5. Pilot light.
- E. Magnetic Controllers: Full voltage, across the line, electrically held.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Configuration: Nonreversing or reversing as indicated on Drawings.
 3. Contactor Coils: Pressure-encapsulated type.
 - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 4. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 5. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 6. Solid-State Overload Relay:
 - a. Switch or dial selectable for motor running overload protection.
 - b. Sensors in each phase.
 - c. Class 10 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 7. External overload reset push button.
- F. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Fusible Disconnecting Means:

- a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class R fuses.
 - b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
3. Nonfusible Disconnecting Means:
- a. NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
 - b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

2.2 ENCLOSURES

- A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
1. Dry and Clean Indoor Locations: Type 1.
 2. Outdoor Locations: Type 3R.
 3. Kitchen and Wash-Down Areas: Type 4X, stainless steel.
 4. Other Wet or Damp Indoor Locations: Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.

2.3 ACCESSORIES

- A. Push Buttons, Pilot Lights, and Selector Switches: NEMA ICS 5; heavy-duty type; factory installed in controller enclosure cover unless otherwise indicated.
- B. Control Relays: Auxiliary and adjustable time-delay relays.
- C. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height, and with disconnect operating handles not higher than 79 inches above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 26 05 29 "Hangers and Supports for Electrical Systems."
- B. Floor-Mounted Controllers: Install enclosed controllers on 4-inch nominal-thickness concrete base.
1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in each fusible-switch enclosed controller.
- E. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."
- F. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- G. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved nameplate.
 3. Label each enclosure-mounted control and pilot device.

3.3 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers and remote devices. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

C. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer and Owner before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Enclosed controllers will be considered defective if they do not pass tests and inspections.

- E. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Set field-adjustable switches and overload-relay pickup and trip ranges.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 262913

SECTION 265100 – INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures, lamps, ballasts and drivers.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Automatic load control relays.
 - 5. Lighting fixture supports.

1.2 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting fixture, including ballast or driver housing if provided.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.
 - 1. Include lamp, ballast, and driver for each fixture.
 - 2. LED Luminaires: Include total luminous flux, electrical power, luminous intensity distribution, and chromaticity report according to IESNA LM-79.
- B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Product Certificates: For each type of ballast and driver for bi-level and dimmer-controlled fixtures, from manufacturer.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

- B. Warrant certificates.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

1.6 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
 - 2. Warranty Period for Emergency Fluorescent Power Units, Emergency LED Power Units, and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.
- B. Special Warranty for Fluorescent Ballasts: Manufacturer's standard form in which manufacturer of agrees to repair or replace components that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Fluorescent Ballasts: Five years from date of Substantial Completion.
- C. Special Warranty for LED Luminaires: Manufacturer's standard form in which manufacturer of agrees to repair or replace components that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period for LED Luminaires: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Comply with UL 1598.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch nominal unless otherwise indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.

2.3 LED LUMINAIRES

- A. General Description: Minimum initial lumens and maximum input wattage indicated on Drawings, CRI 80 (minimum), and color temperature 3500 K.
- B. Chromaticity: Comply with ANSI C78.377.
- C. Energy Star Ratings: Downlights and self-powered LED lamps shall be Energy Star Rated by the U.S. Department of Energy.
- D. Design Lights Consortium: LED luminaires shall be listed on the Design Lights Consortium Qualified Products List.
- E. Useful Lifetime: IESNA TM-21 L70 rating of at least 50,000 hours using IESNA LM-80 test methods.
- F. General Requirements for Electronic Drivers:
 - 1. Comply with UL 8750 and with ANSI C82.11.
 - 2. Designed for type and quantity of LED lamp modules served.
 - 3. Drivers shall be designed for full light output unless dimmer or bi-level control is indicated.
 - 4. Sound Rating: Class A.
 - 5. Total Harmonic Distortion Rating: Less than 10 percent.
 - 6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - 7. Power Factor: 0.90 or higher.
 - 8. Inrush Current: No more than 6 times rated luminaire current at 16 milliseconds.
- G. Drivers for Low-Temperature Environments: Electronic type rated for 0 deg F starting and operating temperature with indicated LED module types.
- H. Drivers for Dimmer-Controlled Lighting Fixtures: Electronic type, UL listed Class 2 low-voltage 0 to 10 V dc controller, unless indicated otherwise.
 - 1. Dimming Range: 100 to 5 percent of rated luminaire lumens.
 - 2. Driver Input Watts: Can be reduced to 20 percent of normal.
 - 3. Compatibility: Certified by manufacturer for use with specific dimming control system and lamp type indicated.

4. Control: Coordinate wiring from driver to control device to ensure that the driver, controller, and connecting wiring are compatible.
- I. Drivers for Bi-Level Controlled Lighting Fixtures: Electronic type, UL listed Class 2 low-voltage control.
 1. Operating Modes: Driver circuit and leads provide for remote control of the light output of the associated luminaire between high- and low-level and off.
 - a. High-Level Operation: 100 percent of rated lamp lumens.
 - b. Low-Level Operation: 30 percent of rated lamp lumens.
 2. Driver shall provide equal current to each LED module in each operating mode.
 3. Compatibility: Certified by manufacturer for use with specific bi-level control system and LED lamp module type indicated.

2.4 EMERGENCY FLUORESCENT POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
 1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 2. Nightlight Connection: Operate one fluorescent lamp continuously.
 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.5 EMERGENCY LED POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with driver. Comply with UL 924.
 1. Emergency Connection: Operate LED modules continuously at an output of 1100 lumens. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture driver.
 2. Nightlight Connection: Operate one LED module continuously.
 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.

- b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
- 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
- 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.6 AUTOMATIC LOAD CONTROL RELAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Cooper Lighting; Sure-Lites Division; a Division of Cooper Industries.
 - 2. IOTA Engineering LLC.
 - 3. Philips Bodine.
- B. Automatic Load Control Relays (ALCR): Provide self-contained, modular unit, factory mounted within luminaire body and compatible with ballast or driver.
 - 1. Comply with UL 924.
 - 2. Provide 120 or 277 V, 60 Hz operation as indicated.
 - 3. Provide painted steel or galvanized steel housing.
 - 4. Provide temperature rating from 32 deg F to 122 deg F.
 - 5. Provide device rated 2.0 W AC input power and 280 mA AC input current or less during normal operation.
 - 6. Provide device capable of switching 3 amps, minimum, electronic fluorescent, LED or incandescent load at 120 V or 277 V.
 - 7. Provide 3 A overcurrent protection of control circuit input and switched load circuit.
 - 8. Normal Mode Operation: Normal AC power is present. AC ballast or driver operates fluorescent or LED lamp(s) as intended, controlled by wall switch.
 - 9. Emergency Mode Operation: Normal AC power fails. ALCR senses normal AC power failure and automatically switches to emergency AC power, bypassing wall switch. When normal AC power is restored, ALCR switches system back to normal mode operation.
 - 10. Provide one ALCR per non-dimmed emergency luminaire, unless otherwise indicated.
 - 11. Provide two ALCRs per dimmer controlled emergency luminaires, unless otherwise indicated.
- C. Whole-Circuit-Type, Automatic Load Control Relays: Provide self-contained, modular, emergency transfer switch unit compatible with ballast and driver.
 - 1. Comply with UL 924.
 - 2. Provide 120 or 277 V, 60 Hz operation as indicated.
 - 3. Provide painted steel or galvanized steel housing.
 - 4. Provide temperature rating from minus 4 deg F to 131 deg F.
 - 5. Provide device rated 4.0 W AC input power and 45 mA AC input current or less during normal operation.
 - 6. Provide device capable of switching 20 amps, minimum, electronic fluorescent, LED or incandescent load at 120 V or 277 V.
 - 7. Normal Mode Operation: Normal AC power is present. AC ballast or driver operates fluorescent and LED lamp(s) as intended, controlled by wall switch.
 - 8. Emergency Mode Operation: Normal AC power fails. ALCR senses normal AC power failure and automatically switches to emergency AC power, bypassing wall switch. When normal AC power is restored, ALCR system back to normal mode operation.

2.7 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.8 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
 - 1. Battery: Sealed, maintenance-free, lead-acid type.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 - 7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.

2.9 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

- E. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- F. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Comply with NFPA 70 for minimum fixture supports.
- C. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265100

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