Project Manual for

NORTHEAST OHIO MEDICAL UNIVERSITY

Rootstown, Ohio

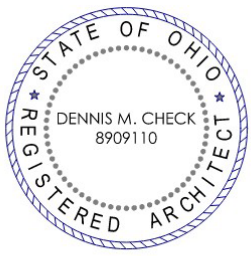
LIBRARY RENOVATION

HASENSTAB ARCHITECTS

PREPARED BY:

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Project No. 26028.000
Issue Date: October 16, 2026
Construction Documents



DENNIS M. CHECK, 8909110 - 12/31/2027

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Document 00 10 00 - Solicitation (General Contracting Project)
State of Ohio Standard Requirements for Public Facility Construction

Sealed bids will be received by:

Dale Hluch, Director
Department of Campus Operations, Door #21, Room P4
Northeast Ohio Medical University
4209 State Route 44
Rootstown, OH 44272
(southeast corner of campus – park in lot D or E)

for the following Project:

NEOMED
Library Renovation
4209 State Route 44
Rootstown, OH 44272

in accordance with the Contract Documents prepared by:

Hasenstab Architects, Inc.
190 N. Union Street, Suite 400
Akron, OH 44304

Bidders may submit requests for consideration of a proposed Substitution for a specified product, equipment, or service to the Architect/Engineer ("A/E") no later than 10 days prior to the bid opening. Additional products, equipment, and services may be accepted as approved Substitutions only by written Addendum.

From time to time, the Commission issues new editions of the "State of Ohio Standard Requirements for Public Facility Construction" and may issue interim changes. Bidders must submit Bids that comply with the version of the Standard Requirements included in the Contract Documents.

Equal Employment Opportunity requirements are applicable to this Project.

This Project is subject to the State of Ohio's Encouraging Diversity, Growth, and Equity ("EDGE") Business Development Program. A Bidder is required to submit with its Bid and with its Bidder's Qualifications form, certain information about the certified EDGE Business Enterprise(s) participating on the Project with the Bidder. Refer to Section 6.1.11 of the Instructions to Bidders.

The EDGE Participation Goal for the Project is 5.0 percent.

The percentage is determined by the contracted value of goods, services, materials, and labor that are provided by EDGE-certified business(es). The participation is calculated on the total amount of each awarded contract. For more information about EDGE, contact the Business Certification Compliance Manager at Stacy.Cornett@development.ohio.gov, or at its physical location: 77 South High Street, 28th Floor, Columbus, Ohio 43215; or by telephone at (614) 728-0088.

The Bidder may be subject to a Pre-Award Affirmative Action Compliance Review in accordance with Section 123:2-5-01 of the Ohio Administrative Code including a review of the Bidder's employment records and an on-site review.

The Bidder must indicate on the Bid Form, the locations where its services will be performed in the spaces provided or by attachment in accordance with the requirements of Executive Order 2019-12D related to providing services only within the United States and the requirements of Executive Order 2022-02D prohibiting purchases from or investment in any Russian institution or company. Failure to do so may cause the Bid to be rejected as non-responsive.

DOMESTIC STEEL USE REQUIREMENTS AS SPECIFIED IN OHIO REVISED CODE SECTION 153.011 APPLY TO THIS PROJECT. COPIES OF OHIO REVISED CODE SECTION 153.011 CAN BE OBTAINED FROM ANY OF THE OFFICES OF THE OHIO FACILITIES CONSTRUCTION COMMISSION.

Bidders are encouraged to be enrolled in and to be in good standing in a Drug-Free Safety Program ("DFSP") approved by the Ohio Bureau of Workers' Compensation ("OBWC") prior to submitting a Bid and provide, on the Bid Form with its Bid, certain information relative to their enrollment in such a program; and, if awarded a Contract, shall comply with other DFSP criteria described in Section 1.6 of the General Conditions.

Bids will be received for:

Trade	Estimate
General Contract	$925,000

Until November 12th, 2026, at 10:00 a.m., when all Bids will be opened and read aloud.

All Bidders are strongly encouraged to attend the Pre-Bid Meeting on October 29, 2026, at 10:00 a.m. until approximately 11:00 a.m., at the following location: Project Site.

The Contractor is responsible for scheduling the Project, coordinating the Subcontractors, and providing other services identified in the Contract Documents.

The Contract Documents are available for purchase from SE Blueprint, Inc., 520 S. Main Street #2411, Akron, OH 44311, tel. 330.376.1689 between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday until deadline for submitting bids at the non-refundable cost of $50 per set, plus shipping, if requested.

The Contract Documents may be reviewed for bidding purposes without charge during business hours at the following locations:

The Builder's Exchange, Inc. (Cleveland)
9555 Rockside Rd., Suite 300
Valley View, Ohio 44125
Phone: (216) 393-6300 Ext 39 / (866) 907-6300
Contact: Laurel Screptock
E-mail: info@bxohio.com
Website: www.bxcleve.com

Pittsburgh Builders Exchange
1813 North Franklin Street
Pittsburgh, Pennsylvania 15233
Phone: (412) 922-4200
Contact: Karen Kleber
E-mail: Karen@pghbx.org
Website: www.pghbx.org

Builder's Exchange of East Central Ohio
5080 Aultman Road
North Canton, Ohio 44720
Phone: (330) 452-8039 Ext 104
Contact: Heather Chapman
E-mail : hchapman@mybx.org
Website: www.mybx.org

Subcontractors Association of Northeast Ohio
637 Vernon Odom Blvd
Akron, Ohio 44307
Phone: (330) 762-9951 Ext 11
Contact: Angela Hawk
E-mail: a.hawk@saneo.com
Website: www.saneo.com

END OF DOCUMENT

Document 00 21 13 - Instructions to Bidders (General Contracting Project)
State of Ohio Standard Requirements for Public Facility Construction

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ARTICLE 1 - GENERAL INSTRUCTIONS

1.1 Applicable Law and Forum

1.1.1 The rights of any Bidder or any party to a subsequent Contract shall be governed by the laws of the state of Ohio and only Ohio courts shall have jurisdiction over any action or proceeding related to the Bid or any subsequent Contract. The Bidder irrevocably consents to such jurisdiction.

1.2 Project Scheduling and Coordination

1.2.1 When the Contract Documents refer to a period of time by a number of days, it excludes the first day and includes the last day of the period. If the last day of the period falls on a Saturday, Sunday, or a legal holiday, that day shall be omitted and the period shall end on the next day which is not a Saturday, Sunday, or legal holiday.

1.2.2 The time for completion of the Project indicated on the **Bid Form** is the time for Substantial Completion applicable to the Bidder.

1.2.3 The State may assign all or any portion of its interest in a Contract with one or more of the successful Bidders to another successful Bidder as an agreed condition for an award of the Contract for the respective Bid. The assignment may include, without limitation, the duty to schedule, coordinate, and administer the Contract.

1.2.4 The Contractor is responsible for scheduling the Project, coordinating the Subcontractors, and providing other services identified in the Contract Documents.

1.2.5 By submitting its Bid, the Bidder indicates its understanding that the Contract Sum, based on its Bid and as amended by Change Orders, includes all costs that the Contracting Authority owes the Bidder.

1.3 Written Notice

1.3.1 Notice under the Contract Documents shall be validly given if:

1.3.1.1 delivered personally to a member of the organization for whom the notice is intended;

1.3.1.2 delivered, or sent by registered or certified mail, to the last known business address of the organization; or

1.3.1.3 sent by facsimile, email, or web-based project management software, provided the original signed document is delivered within 3 business days after the date of the electronic transmission.

1.3.2 Notices provided to one Project Participant from another shall be simultaneously copied to the prospective Bidders, the Owner, the Contracting Authority, and the A/E.

ARTICLE 2 - BIDDING PROCEDURES

2.1 Examination of Contract Documents and the Site

2.1.1 Before submitting a Bid, the Bidder shall examine all Contract Documents, including, but not limited to, the Drawings, Specifications, and Addenda for all divisions of Work for the Project, noting in particular all requirements that may affect its Work in any way.

2.1.2 The Bidder's failure to become acquainted with the extent and nature of Work required to complete any portion of the Work in conformity with the requirements of the Contract Documents, shall not be a basis for additional compensation.

2.1.3 Before submitting a Bid, the Bidder should not only examine and evaluate the Site and related Project conditions where the Work will be performed, but shall also consider when the Work will be performed including, but not limited to, the following:

2.1.3.1 the condition, layout, and nature of the Site and surrounding area;

2.1.3.2 the availability and cost of labor;

2.1.3.3 the availability and cost of materials, supplies, and equipment;

2.1.3.4 the cost of temporary utilities required in the Bid;

2.1.3.5 the cost of any permit or license required by a local or regional authority having jurisdiction over the Project;

2.1.3.6 the usual weather conditions of the Project location;

2.1.3.7 conditions bearing upon transportation, disposal, handling, and storage of equipment, materials, and waste; and

2.1.3.8 subsurface and concealed physical conditions and related information provided in the Contract Documents.

2.2 Pre-Bid Meeting

2.2.1 The Bidder is encouraged to attend the pre-bid meeting, where the A/E, the Contracting Authority, and the Owner will receive questions regarding the Contract Documents. If not given in **Document 00 10 00 - Solicitation**, the A/E shall issue notice of the time and place of any pre-bid meeting to each registered Plan Holder.

2.2.2 The A/E shall prepare minutes of the pre-bid meeting for the Project record. If questions raised by the prospective Bidders require changes to, or clarifications of, the Contract Documents, the A/E shall issue the changes by written Addendum, along with a list of pre-bid meeting attendees.

2.2.3 Additional compensation shall not be based upon the Bidder's failure to attend the pre-bid meeting, which results in the Bidder's incomplete knowledge and familiarity of the Project requirements.

2.3 Request for Interpretation

2.3.1 If the Bidder finds any perceived ambiguity, conflict, error, omission, or discrepancy within the Contract Documents, including the Drawings, Specifications, and Addenda, or between any of the Contract Documents and Applicable Law, the Bidder shall submit a written Request for Interpretation ("RFI") to the A/E for an interpretation or clarification.

2.3.1.1 The Bidder is responsible for prompt delivery of the RFI.

2.3.1.2 The A/E shall respond to RFIs received more than 7 days before the bid opening.

2.3.2 The A/E shall issue Addenda in response to RFIs that modify or clarify the Contract Documents. Any Addenda issued within 72 hours before any bid opening (excluding Saturdays, Sundays, and legal holidays) shall extend the bid opening date by 7 days pursuant to **Section 3.3.1**.

2.3.2.1 The Addenda may be delivered via facsimile or e-mail, posted to a web or FTP site, or otherwise furnished to each registered Plan Holder.

2.3.3 Any interpretation or clarification of the Contract Documents made by any Person other than the A/E, in any manner other than a written Addendum, shall not be binding, and the Bidder shall not rely upon the interpretation or clarification.

2.3.4 The successful Bidder shall not be compensated for a claim alleging insufficient data, incomplete, ambiguous, conflicting, or erroneous Contract Documents or proposed Contract Documents, or assumed conditions regarding the nature, extent, or character of the Work, if the Bidder did not submit a related RFI prior to the bid opening.

2.4 Basis of Design and Acceptable Components

2.4.1 The Contract Documents may list components produced by specific manufacturers to denote kind, quality, or performance requirements.

2.4.2 The component listed first is the Basis of Design Component.

2.4.3 Other listed components are Acceptable Components.

2.4.3.1 If the Bidder includes an Acceptable Component in its Bid, the Bidder is responsible for the costs of coordination and modification required.

2.5 Substitutions Prior to Bid Opening

2.5.1 If the Bidder proposes to use an article, device, material, equipment, form of construction, fixture, or item other than the Basis of Design or Acceptable Components named in the Specifications, the Bidder shall certify that the proposed item is equal in quality and all aspects of performance and appearance, to the item specified.

2.5.1.1 If approval of a Substitution requires changes to the Contract Documents or affects the work of other trades, the Bidder is responsible for the additional costs, including, but not limited to, changes to the design by the A/E.

2.5.2 The Bidder shall submit its request for Substitution to the A/E no later than 10 days prior to the bid opening, which must include:

2.5.2.1 the name and complete description of the proposed Substitution, including Drawings, performance and test data, and other information necessary for a complete evaluation; and

2.5.2.2 a statement setting forth any changes that the Proposed Substitution will require in the Contract Documents or the Project.

2.5.3 If the A/E approves the Proposed Substitution, the A/E shall issue an Addendum.

2.5.4 If the A/E does not approve the Proposed Substitution, the A/E shall inform the Bidder of its decision, which is final. The A/E may reject a proposed Substitution because the Bidder failed to provide sufficient information to enable the A/E to completely evaluate the Proposed Substitution without causing a delay in the scheduled bid opening.

2.5.5 Proposed Substitutions received by the A/E less than 10 days prior to the bid opening shall not be considered.

2.6 Bid Form

2.6.1 Each Bid shall be submitted on the **Bid Form** and sealed in an envelope clearly marked as containing a Bid, indicating the Contracting Authority's Project number and name, and the date and time of the bid opening on the envelope. Refer to **Section 3.1.2** for requirements related to envelope markings.

2.6.1.1 Any change, alteration, omission, or addition in the wording of the **Bid Form** shall cause the Bid to be rejected as non-responsive.

2.6.1.2 All pages of the **Bid Form**, including a completed "Bidder Affirmation and Disclosure" page acknowledging that the Bidder affirms, understands, and will abide by the requirements of Executive Order 2019-12D related to providing services only within the United States and Executive Order 2022-02D prohibiting purchases from or investment in any Russian institution or company, and a completed "Commitment to Participate in the EDGE Business Assistance Program" page, shall be submitted with the Bid. Failure to do so may cause the Bid to be rejected as non-responsive.

.1 If the names, locations, and service locations of Subcontractors are not known at the time of the Bid Opening, the Bidder must provide the information requested with its **Subcontractor and Material Supplier Declaration** form.

2.6.1.3 Unless the Bidder withdraws the Bid as provided in **Article 4**, the Bidder is required to comply with all requirements of the Contract Documents, regardless of whether the Bidder had actual knowledge of the requirements and regardless of any statement or omission made by the Bidder that might indicate a contrary intention.

2.6.2 The Bidder shall fill in all relevant blank spaces on the **Bid Form** by printing in ink or by typewriting, and not in pencil.

2.6.2.1 The Bidder shall show all bid amounts in both words and figures. In the case of a conflict between the words and figures, the amount shown in words shall govern, where the words are not ambiguous. When the Bidder's intention and the meaning of the words are clear, omissions, or misspellings of words shall not render the words ambiguous.

2.6.2.2 The Bidder shall initial alteration or erasure of items filled in on the **Bid Form**.

2.6.3 If the Bidder is a corporation, partnership, or sole proprietorship, an officer, partner or principal of the Bidder shall print or type the legal name of the Bidder on the line provided, and sign the **Bid Form**. If the Bidder is a joint venture, an officer, partner or principal, as applicable, of each member of the joint venture shall print or type the legal name of the applicable member on the line provided, and sign the **Bid Form** on behalf of that member. All signatures must be original.

2.7 Allowances

2.7.1 If Allowances are provided on the **Bid Form**, the amount of each Allowance shall be included in the Base Bid amount. Allowances shall be used solely for the purpose of determining the adjustment to the Contract Sum for the difference between the amount of the Allowance and the actual cost of the related Work provided. Allowances shall not include the Contractor's Fee.

2.8 Unit Prices

2.8.1 If Unit Prices are requested on the **Bid Form**, the amount of the scheduled quantities shall be included in the Base Bid amount. Unit prices shall be used solely for the purpose of determining the adjustment to the Contract Sum for the difference between the estimated quantities on the **Bid Form** and the actual quantities provided.

2.8.2 Unit Prices shall include all materials, equipment, labor, delivery, installation, and any other cost or expense, in connection with, or incidental to, the performance of that portion of the Work. Unit Prices shall not include the Contractor's Fee on account of the associated Unit Price Work. The Bidder shall submit Unit Prices for all items listed.

2.9 Alternates

2.9.1 If an Alternate is listed on the **Bid Form**, the Bidder shall fill in the applicable blank with an increased or decreased bid amount and indicate which by circling the word "ADD" or the word "DEDUCT" as applicable. The Contracting Authority reserves the right to accept or reject any or all bid amounts for Alternates, in whole or in part, and in any order.

2.9.1.1 If no change in the bid amount is required, indicate "No Change" or "$0."

2.9.1.2 Failure to make an entry or an entry of "No Bid," "N/A," or similar entry on any Alternate shall cause the Bid to be rejected as non-responsive if that Alternate is selected.

2.9.1.3 Failure to indicate a negative number by circling "DEDUCT," preceding the number by a minus sign, or enclosing the number in parentheses will indicate the Bidder's intent to increase the Base Bid by the amount entered in the applicable blank.

2.9.1.4 If an Alternate is not selected, an entry as listed in **Section 2.9.1.2** on that Alternate shall not, by itself, render a Bid non-responsive.

2.10 Submittals with Bid Form

2.10.1 The Contracting Authority shall reject a Bid as non-responsive if the Bidder fails to submit the following with the Bid Form in a sealed envelope:

2.10.1.1 A Bid Guaranty as provided in **Article 5**, meeting the requirements of Ohio Revised Code ("ORC") Sections 153.54 and 153.571.

2.10.2 If the apparent low Bidder does not submit a valid Power of Attorney of the agent signing for the Surety with its Bid, the Contracting Authority shall direct the apparent low Bidder to deliver a valid and appropriate Power of Attorney to the Contracting Authority within a period determined by the Contracting Authority. The Contracting Authority shall not enter into a Contract without a valid Power of Attorney.

2.10.3 The Bidder is encouraged to submit background information with its Bid using the **Bidder's Qualifications** form and including, but not limited to, the information listed in this **Section 2.10**. If the apparent low Bidder does not submit the **Bidder's Qualifications** form and related information with its Bid, the Bidder shall provide it upon request in accordance with **Section 3.5.4**, including, but not limited to:

2.10.3.1 the overall experience of the Bidder, including number of years in business under present and former business names;

2.10.3.2 a complete listing of all the Bidder's ongoing construction projects and a listing of construction projects which are similar in cost and type to the Project completed by the Bidder in the last 5 years. Include information of the scope of work and value of each contract, a description of Encouraging Diversity Growth and Equity ("EDGE")

participation and performance, and a project name/contact Person/address/phone number for the owner and the architect or engineer for each project;

2.10.3.3 a Certificate of Compliance with Affirmative Action Programs, issued pursuant to ORC Section 9.47, by the Equal Opportunity Coordinator of the Department of Administrative Services;

2.10.3.4 a complete listing of Affirmative Action and EDGE program violations in the last 5 years;

2.10.3.5 a complete listing of Prevailing Wage, EPA, OSHA, or other regulatory entity issues or violations in the last 5 years;

2.10.3.6 a complete listing of judgments, claims, arbitration proceedings or suits pending or outstanding in the last 5 years;

2.10.3.7 a complete listing of Drug-Free Workplace Program and Drug-Free Safety Program ("DFSP") violations in the last 5 years;

2.10.3.8 upon request of the Contracting Authority, the apparent low Bidder shall submit the following information, which is not a public record under ORC Section 149.43; and shall remain confidential, except under proper order of a court:

- **.1** an annual financial statement prepared within the 12 months prior to the bid opening by an independent licensed accounting firm; and the name, address, contact Person, and phone number of the bank normally used by the Bidder for its primary banking***;*** or
- **.2** a financial report generated within 30 days prior to the bid opening from Standard and Poor, Dun and Bradstreet or a similar company acceptable to the Contracting Authority documenting the financial condition of the Bidder; and the name, address, contact Person, and phone number of the bank normally used by the Bidder for its primary banking.

2.10.3.9 a description of the Bidder's relevant facilities and major equipment, whether leased or owned;

2.10.3.10 a description of the management experience of the Bidder's project manager(s) and superintendent(s) and a comprehensive resume for each;

2.10.3.11 a description of the EDGE-certified Business Enterprises the Bidder proposes as Subcontractors and Material Suppliers for this Project by attaching a fully completed EDGE Affidavit for each EDGE-certified Business Enterprise;

2.10.3.12 to support a Bond, a current and signed Certificate of Compliance issued by the Ohio Department of Insurance, showing the Surety is licensed to do business as a surety in Ohio;

2.10.3.13 a current Ohio Workers' Compensation Certificate;

2.10.3.14 if the Bidder is a foreign corporation not incorporated under the laws of Ohio, a Certificate of Good Standing from the Ohio Secretary of State; or, if the Bidder is a foreign person or partnership, evidence that the Bidder filed, with the Ohio Secretary of State, a Power of Attorney designating the Ohio Secretary of State as the Bidder's agent for the purpose of accepting service of summons in any action brought under ORC Section 153.05 or under ORC Sections 4123.01 to 4123.94, inclusive;

2.10.3.15 evidence that the Bidder is enrolled in, and in good standing in, a DFSP approved by the Ohio Bureau of Workers' Compensation ("OBWC"); and

2.10.3.16 any other data or information which the A/E may request concerning the responsibility of the Bidder, including a complete list of major Subcontractors with an estimated contract value of $200,000 or more, which the Bidder proposes to employ on the Project.

2.11 Changes in the Bid Amount

2.11.1 Any change to a previously submitted Bid shall be in writing and received by the Contracting Authority before the time scheduled for the bid opening.

2.11.2 Changes shall provide an amount to be added to, or subtracted from, the bid amount, so that the final bid amount may be determined only after the sealed envelope is opened.

2.11.3 If the Bidder's written instruction reveals the bid amount in any way prior to the bid opening, the Contracting Authority may, in its sole discretion, reject the Bid as non-responsive.

ARTICLE 3 - BID OPENING AND EVALUATION

3.1 Delivery of Bid

3.1.1 The Bidder shall submit its Bid to the Contracting Authority at the location indicated in **Document 00 10 00 - Solicitation** prior to the time scheduled for the bid opening.

3.1.2 If the sealed bid envelope is enclosed in another envelope for the purpose of delivery, the exterior envelope shall also be clearly marked as containing a Bid with the Project name and Project number, construction trade of the Bid, and the date and time of the bid opening shown on the envelope.

3.1.3 Bids that arrive at the location designated in **Document 00 10 00 - Solicitation** after the time set for the bid opening shall not be opened or considered.

3.2 Bid Opening

3.2.1 Sealed Bids shall be received at the location designated in **Document 00 10 00 - Solicitation** until the time stated when all Bids shall be opened, read aloud, and the tabulation made public.

3.2.2 The public opening and reading of Bids is for informational purposes only and is not to be construed as an acceptance or rejection of any Bid submitted.

3.2.3 The contents of the bid envelope are public records and open for inspection, upon request, at any time after the bid opening, except for any information that is not defined as a public record under Ohio law.

3.3 Bid Opening Extension

3.3.1 If an Addendum is issued within 72 hours prior to the published time for the bid opening, excluding Saturdays, Sundays and legal holidays, the bid opening shall be extended 7 days. If the Contracting Authority approves, the bid opening may be extended for more than 7 days, and consideration for additional advertising may be recommended.

3.3.2 As part of issuing any Addendum earlier than 72 hours prior to the published time for the bid opening, excluding Saturdays, Sundays and legal holidays, only the Contracting Authority may approve a revised bid opening date or additional advertising.

3.4 Bid Evaluation Criteria

3.4.1 The Contracting Authority reserves the right to accept or reject any or all Bids, in whole or in part, and reserves the right to award the Contract to any remaining Bidder the Contracting Authority determines, in its sole discretion, to have submitted the lowest responsive and responsible Bid.

3.4.2 The Contracting Authority reserves the right to accept or reject any or all Alternates. Alternates may be accepted or rejected in any order.

3.4.3 If any Bidder has engaged in collusive bidding, the Contracting Authority shall reject that Bidder's Bid as non-responsible for the Contract. A collusive bidder may also be debarred from future State Contracts.

3.4.4 The Contracting Authority reserves the right to waive, or to allow any Bidder a reasonable opportunity to cure a minor irregularity or technical deficiency in a Bid, provided the irregularity or deficiency does not affect the bid amount, or otherwise give the Bidder a competitive advantage. Noncompliance with any material requirements of the Contract Documents shall cause a Bid to be rejected as non-responsive.

3.4.5 If, in the opinion of the Owner, the award of the Contract to the lowest Bidder is not in the best interest of the State, with the written consent of the Contracting Authority, the Owner may accept, in its discretion, another Bid so opened, or the Contracting Authority may reject all Bids and advertise for other Bids. The advertisement shall be for the period, in the form, and in the publications directed by the Contracting Authority.

3.5 Bid Evaluation Procedure

3.5.1 The Contract shall be awarded to the lowest responsive and responsible Bidder as determined in the discretion of the Contracting Authority, or all Bids may be rejected in accordance with Applicable Law.

3.5.1.1 In determining which Bid is the lowest, the Contracting Authority shall consider the Base Bid and the bid amounts for any Alternate, or Alternates, which the Owner decides, in its sole discretion, to accept.

3.5.1.2 The total of the bid amounts for the accepted Alternate(s) shall be added to, or deducted from, the Base Bid,

as applicable, for determining the lowest Bidder.

3.5.1.3 If two Bidders submit the same bid amount and both are determined to be responsive and responsible, the Contracting Authority may select one Bidder by the flip of a coin, which shall be conducted in the presence of both Bidders and shall be final.

.1 If one of the Bidders refuses to participate in, or fails to be present at, the flip of a coin, the remaining Bidder shall be selected.

3.5.2 A Bidder for a Contract shall be considered responsive if the Bidder's Bid responds to the Contract Documents in all material respects and contains no irregularities or deviations from the Contract Documents that would affect the amount of the Bid or otherwise give the Bidder a competitive advantage.

3.5.2.1 A Bid shall be rejected as non-responsive if the Bid contains a Bid Guaranty executed by a Surety not licensed in Ohio or a Bid Guaranty that is otherwise determined to be insufficient by the Contracting Authority.

3.5.2.2 The Bidder may be subject to a Pre-Award Affirmative Action Compliance Review pursuant to OAC Section 123:2-5-01 including a review of the Bidder's employment records and an on-site review.

.1 The Bidder must submit the information requested no later than 10 days after receipt of the request. Failure to timely respond to this request for records may result in the Bidder being found non-responsive.

3.5.2.3 If the lowest Bidder is non-responsive, the Bidder shall be notified according to **Section 3.6**.

3.5.3 In determining whether a Bidder is responsible, factors to be considered include, without limitation:

3.5.3.1 preferences required by law, where applicable;

3.5.3.2 the experience of the Bidder;

3.5.3.3 the financial condition of the Bidder;

3.5.3.4 the conduct and performance of the Bidder on previous Contracts, including compliance with Equal Employment Opportunity in the Construction Industry Administrative Rules, OSHA and Prevailing Wage laws, and demonstration of good faith effort to participate in the EDGE Business Development program, or actual participation in the EDGE Business Development program, or both, as indicated in the ORC and the Ohio Administrative Code;

3.5.3.5 the facilities of the Bidder;

3.5.3.6 the management skills of the Bidder, including the capability of the Bidder to construct and manage the entire Project, including but not limited to the plumbing, fire protection, heating, ventilating and air conditioning, and electrical branches or classes of the Work; and

3.5.3.7 the Bidder's ability to execute the Contract properly, including past performance of the Bidder and the Subcontractors that the Bidder proposes to use on the Project.

3.5.4 The A/E shall obtain from the lowest responsive Bidder any information the Contracting Authority determines appropriate to consideration of factors showing responsibility. If the lowest responsive Bidder is responsible, the Contract shall be awarded to that Bidder, unless all Bids are rejected. The Bidder shall provide all requested information within 3 days of a request from the A/E**,** or a longer period, if the Contracting Authority consents in writing.

3.5.5 If the lowest responsive Bidder is not responsible, the Contracting Authority shall evaluate the next lowest Bidder according to the procedures set forth in this **Section 3.5** until the Contract is awarded, all Bids are rejected, or all responsive Bidders are determined to be not responsible.

3.6 Rejection of Bid

3.6.1 If the lowest Bidder is not responsive or responsible, the Contracting Authority shall reject the Bid and notify the Bidder in writing by Certified Mail of the finding and the reasons for the finding.

3.6.2 Ten Percent Rule.

3.6.2.1 If the lowest responsive and responsible Bid for the Contract, including the Base Bid and accepted Alternates if any, exceeds an amount 10 percent greater than the published Estimated Construction Cost for the Contract, the Contracting Authority shall reject all Bids.

3.6.3 A Bidder notified in accordance with **Section 3.6.1** may object to its rejection by filing a written protest, which must be received by the Contracting Authority within 5 days of the notification provided pursuant to **Section 3.6.1**.

3.6.4 Upon receipt of a timely protest, the Contracting Authority shall meet with the protesting Bidder to hear its objections. ORC Chapter 119 administrative hearing requirements are not applicable to the bid protest meeting**.**

3.6.4.1 No Contract award shall become final until after the Contracting Authority has met with all Bidders who have timely filed protests and the award of the Contract is affirmed by the Contracting Authority.

3.6.4.2 If all protests are rejected, the Contract shall be awarded to the lowest responsive and responsible Bidder, or all Bids shall be rejected.

3.7 Notice of Intent to Award

3.7.1 The Contracting Authority shall notify the apparent successful Bidder that upon satisfactory compliance with all conditions precedent for execution of the Contract, within the time specified, the Bidder shall be awarded the Contract.

3.7.2 The Contracting Authority reserves the right to rescind any Notice of Intent to Award if the Contracting Authority determines it issued the Notice of Intent to Award in error, or if the conditions precedent for execution of Contract set forth in **Article 6** are not met.

ARTICLE 4 - WITHDRAWAL OF BID

4.1 Withdrawal prior to Bid Opening

4.1.1 A Bidder may withdraw a Bid after the Contracting Authority receives the Bid, provided the Bidder makes a request in writing and the Contracting Authority receives the request prior to the time of the bid opening, as determined by the Contracting Authority.

4.2 Withdrawal after Bid Opening

4.2.1 The Bid shall remain valid and open for acceptance for a period of 60 days after the bid opening; provided, however, a Bidder may withdraw a Bid from consideration after the bid opening if the bid amount was substantially lower than the amounts of other Bids, providing the Bid was submitted in good faith, and the reason for the bid amount being substantially lower was a clerical mistake, as opposed to a judgment mistake, and was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of Work, labor, or material made directly in the compilation of the bid amount.

4.2.1.1 Notice of a request to withdraw a Bid shall be made in writing filed with the Contracting Authority within 2 business days after the bid opening. The Contracting Authority reserves the right to request the Bidder to submit evidence substantiating the Bidder's request to withdraw the Bid.

4.2.1.2 No Bid may be withdrawn under **Section 4.2.1** which would result in awarding a Contract involving the same item on another Bid to the same Bidder.

4.2.2 If a Bidder withdraws its Bid under **Section 4.2.1**, the Contracting Authority may award the Contract to the next lowest responsive and responsible Bidder, or reject all Bids and advertise for other Bids. In the event the Contracting Authority advertises for other Bids, the withdrawing Bidder shall pay the costs, in connection with the re-bidding, of printing new Contract Documents, required advertising, and printing and mailing of notices to prospective Bidders, if the Contracting Authority finds that these costs would not have been incurred but for the withdrawal.

4.2.3 A Bidder may withdraw the Bidder's Bid at any time after the 60-day period described in **Section 4.2.1** by giving written notice to the Contracting Authority.

4.3 Refusal to Accept Withdrawal

4.3.1 If the Contracting Authority contests the right of a Bidder to withdraw a Bid pursuant to **Section 4.2.1**, a hearing shall be held within 10 days after the bid opening and the Contracting Authority shall issue an order allowing or denying the claim of this right within 5 days after the hearing is concluded. The Contracting Authority shall give the withdrawing Bidder timely notice of the time and place of the hearing.

4.3.1.1 The Contracting Authority shall make a stenographic record of all testimony, other evidence, and rulings on the admissibility of evidence presented at the hearing. The Bidder shall pay the costs of the hearing.

4.3.1.2 Pursuant to ORC Section 119.12, the Bidder may appeal the order of the Contracting Authority required by **Section 4.3.1**.

4.4 Refusal to Perform

4.4.1 In the event the Contracting Authority denies the request for withdrawal and the Bidder refuses to perform the Contract, the Contracting Authority may reject all Bids or award the Contract to the next lowest responsive and responsible Bidder.

4.5 Effect of Withdrawal

4.5.1 A Bidder, who is permitted to withdraw a Bid under **Section 4.2.1**, shall not supply material or labor to, or perform a subcontract or other work for, the Person to whom the Contract is awarded; or otherwise benefit, directly or indirectly, from the performance of the Project for which the withdrawn Bid was submitted; without the Contracting Authority's prior written consent.

ARTICLE 5 - BID GUARANTY AND BOND

5.1 Bid Guaranty

5.1.1 The Bidder shall submit a Bid Guaranty with the Bidder's Bid, payable to the Contracting Authority, in the form of either:

5.1.1.1 the signed **Document 00 43 13 - Bid Security Form** contained in the Contract Documents for the amount of the Base Bid plus all additive Alternates; or

5.1.1.2 a certified check, cashier's check, or letter of credit, for 10 percent of the Base Bid, plus all additive Alternates – a letter of credit shall expressly provide that it is revocable only by the Contracting Authority.

5.1.2 The Bid Guaranty shall be in form and substance satisfactory to the Contracting Authority and shall serve as an assurance that upon acceptance of the Bid, the Bidder shall comply with all conditions precedent for Contract execution, within the time specified by the Contracting Authority.

5.1.3 If the blank line on the **Bid Security Form** is not filled in, the penal sum shall be the full amount of the Base Bid plus all additive Alternates. If the blank line is filled in, the amount shall not be less than the full amount of the Base Bid plus all additive Alternates, stated in dollars and cents. A percentage is not acceptable. In the event the blank line is filled in for an amount less than the full amount of the Base Bid plus all additive alternates, the Bid shall be rejected as non-responsive.

5.1.4 An authorized agent must sign the **Bid Security Form**, and the Bidder shall provide a Power of Attorney from the Surety. A Surety authorized by the Ohio Department of Insurance to transact business in Ohio must issue the **Bid Security Form**.

5.1.5 The requirements of ORC Section 3901.86 may be applicable requiring an Ohio resident agent countersign the **Bid Security Form**. The Bidder shall determine the applicability of this provision.

5.1.6 Bid Guaranties in the form of a certified check, cashier's check, or letter of credit shall be returned to unsuccessful Bidders 60 days after the bid opening. Bid Guaranties in the form of a certified check, cashier's check, or letter of credit shall be returned to the successful Bidder upon providing **Document 00 61 13 - Performance and Payment Bond Form** from a Surety satisfactory to the Contracting Authority.

5.2 Forfeiture of Bid Guaranty

5.2.1 If for any reason, other than as authorized by **Section 4.2.1** or **Section 5.3**, the Bidder fails to execute the Agreement, and the Contracting Authority awards the Contract to another Bidder, which the Contracting Authority determines is the lowest responsive and responsible Bidder:

5.2.1.1 The Bidder who failed to execute the Agreement is liable to the State for the difference between its Bid and the Bid of the next lowest responsive and responsible Bidder, or for a penal sum not to exceed ten percent of the bid amount, whichever is less.

5.2.2 If the Contracting Authority then awards a Contract to another Bidder, which the Contracting Authority determines is the lowest responsive and responsible Bidder and that Bidder fails or refuses to execute the Agreement:

5.2.2.1 The liability of the lowest responsive and responsible Bidder shall be the difference between the bid amount of the lowest responsive and responsible Bidder and another Bidder which the Contracting Authority determines is the lowest responsive and responsible Bidder, except as provided in **Section 5.3**, but not in excess of the liability specified in **Section 4.2.2**.

5.2.2.2 The liability on account of an award to the lowest responsive and responsible Bidder beyond the third lowest

responsive and responsible Bidder shall be determined in like manner.

5.2.3 If the Contracting Authority does not award the Contract to another Bidder under **Section 5.2.2**, but submits the Project for re-bidding:

5.2.3.1 The Bidder failing or refusing to execute the Agreement is liable to the State for a penal sum not to exceed 10 percent of the Bidder's bid amount or the costs in connection with the resubmission of printing new Contract Documents, required advertising, and printing and mailing notices to prospective Bidders, whichever is less, except as provided in **Section 5.3**.

5.3 Exception to Forfeiture

5.3.1 A Bidder for a Contract with the State costing less than $500,000 may withdraw its Bid from consideration if its Bid for another Contract with the State for less than $500,000 has already been accepted if:

5.3.1.1 the Bidder certifies in good faith that the total amount of its current contracts is less than $500,000; and

5.3.1.2 the Bidder's Surety certifies in good faith that the Bidder is unable to perform the subsequent Contract because such performance would exceed the Bidder's bonding capacity.

5.3.2 If a Bid is withdrawn pursuant to **Section 5.3.1**:

5.3.2.1 the Contracting Authority may award the Contract to another Bidder which the Contracting Authority determines is the lowest responsive and responsible Bidder or reject all Bids and submit the Project for re-bidding; and

5.3.2.2 neither the withdrawing Bidder nor the Bidder's Surety shall be liable for the difference between the Bidder's Bid and that of the next lowest responsive and responsible Bidder for a penal sum, or for the costs of printing new Contract Documents, required advertising, and printing and mailing notices to prospective Bidders.

5.4 Bond

5.4.1 Prior to signing the Agreement, the Bidder shall provide the Bond required by law in form and substance satisfactory to the Contracting Authority, and from a Surety licensed to do business in the state of Ohio and satisfactory to the Contracting Authority.

5.4.1.1 If the Bidder provided **Document 00 43 13 - Bid Security Form**, described in **Section 5.1.1.1**, as its Bid Guaranty then that form shall be the Bond.

5.4.1.2 If the Bidder provided another form of Bid Guaranty, described in **Section 5.1.1.2**, then **Document 00 61 13 - Performance and Payment Bond Form**, described in **Section 5.1.6**, shall be the Bond.

5.4.1.3 The Bidder shall not be required to provide both forms described above.

5.4.2 The Bond must be in the full amount of the Contract to indemnify the State against all direct and consequential damages suffered by failure of the Contractor to perform according to the provisions of the Contract and in accordance with the Plans, Specifications, details, and bills of material therefore and pay all lawful claims of Subcontractors, Material Suppliers, and laborers for labor performed or materials furnished in performing and completing the Contract.

ARTICLE 6 - CONTRACT AWARD AND EXECUTION

6.1 Conditions Precedent for Execution of Contract

6.1.1 The successful Bidder must submit the items in this **Section 6.1** to the Contracting Authority before executing the Agreement.

6.1.2 Bond, and to support the Bond, a Certificate of Compliance issued by the Ohio Department of Insurance, showing the Surety is licensed to do business in the state of Ohio.

6.1.3 Ohio Workers' Compensation Certificate

6.1.4 Certificate of Compliance with Affirmative Action Programs, issued by the Equal Opportunity Coordinator. The form must be submitted through the Ohio Business Gateway: http://business.ohio.gov/efiling/.

6.1.5 Certificate of Insurance (ACORD form is acceptable) and copy of additional insured or loss payee endorsement. The Contracting Authority reserves the right to request and receive a certified copy of the Contractor's insurance policies.

6.1.6 If a Bidder is a foreign corporation (e.g., not incorporated under the laws of Ohio) it must submit a Certificate of Good Standing from the Ohio Secretary of State showing the right of the Bidder to do business in the state of Ohio.

6.1.7 If a Bidder is an individual or partnership, nonresident of the State, it must submit a Power of Attorney designating the Ohio Secretary of State as the Bidder's agent for accepting service of summons in any action brought under ORC Section 153.05 or under ORC Sections 4123.01 to 4123.94, inclusive.

6.1.8 If the Contract includes plumbing; electrical; hydronics; refrigeration; and heating, ventilating and air conditioning ("HVAC") Work, the Contractor or its Subcontractors must submit proof of current licensing pursuant to Applicable Law.

6.1.9 Evidence that the Bidder is enrolled in, and in good standing in, a DFSP approved by the OBWC.

6.1.10 Required Notice of Unresolved Findings for Recovery.

6.1.10.1 By submitting its Bid, the Bidder warrants that it is not subject to an unresolved findings for recovery under ORC Section 9.24. ORC Section 9.24 prohibits the State from awarding a Contract to any Bidder against whom the Auditor of State has issued a finding for recovery if the finding for recovery is unresolved at the time of award. If the Contract is awarded to a Bidder subject to an unresolved finding for recovery under ORC Section 9.24, the Contract is void on its face and the Contractor shall immediately repay to the Owner any funds paid under the Contract.

6.1.11 EDGE Program – Supporting Documentation Required.

6.1.11.1 The Bidder shall provide evidence acceptable to the Contracting Authority of the Bidder's participation in the EDGE Program by contracting with EDGE-certified Business Enterprise(s) for the Project by submitting a fully completed **EDGE Affidavit** for each EDGE-certified Business Enterprise, by requesting a waiver or partial waiver of the advertised EDGE Program participation goal for the Project on the Bidder's company letterhead including full documentation of the Bidder's good faith effort to contract with EDGE-certified Business Enterprise(s) for this Project, or both.

6.1.12 Registered Apprentices – Supporting Documentation Required.

6.1.12.1 The Bidder shall provide evidence acceptable to the Contracting Authority of the registration of all apprentices who the Bidder or its Subcontractors intend to employ on the Project pursuant to ORC Section 4115.05.

6.1.13 If the Bidder is a joint venture, it must submit the executed agreement between the joint venturers describing the division of services/work and percentage of contract for each company, and a Power of Attorney which authorizes one or more individuals to bind the joint venture and each individual joint venturer to Contract Modifications.

6.2 Non-compliance with Conditions Precedent

6.2.1 The award of the Contract and execution of the Agreement require the Contractor to comply with:

6.2.1.1 all conditions precedent for execution of the Contract within 10 days of the date of the Notice of Intent to Award; and

6.2.1.2 the **Bidder's Qualifications** form, including a fully completed EDGE Affidavit for each EDGE-certified Business Enterprise, not previously provided within 3 business days of receiving the Contracting Authority's request.

6.2.2 Non-compliance with the conditions precedent for execution of the Contract as stated in **Section 6.1** within the timelines stated in **Section 6.2.1** following the date of the Notice of Intent to Award shall be sufficient cause to permit the Contracting Authority to cancel the Notice of Intent to Award, for the Bidder's lack of responsibility and award the Contract to another Bidder, which the Contracting Authority determines is the lowest responsive and responsible Bidder; or the Contracting Authority may re-bid the Work at its sole discretion.

6.2.3 The Contracting Authority may extend the time for complying with the conditions precedent for execution of the Contract for good cause. The extension is not a waiver of the conditions precedent for execution of the Contract.

6.3 Time Limits

6.3.1 The Contracting Authority's failure to award the Contract and execute the Agreement-within 60 days of the bid opening invalidates the entire bid process and all Bids submitted, unless the time is extended by written consent of the apparent lowest responsive and responsible Bidder and the Contracting Authority.

6.3.1.1 If the Contracting Authority awards the Contract within 60 days of the bid opening, increases in material, labor, and subcontract costs shall be borne by the Bidder.

6.3.1.2 If failure to execute the Contract within 60 days of the bid opening is due to matters for which the State is solely responsible, the Contractor is entitled to a Change Order authorizing payment of verifiable increased costs in materials, labor, or subcontracts. This increase shall not exceed the difference in price between the successful Bidder and the price of the next lowest responsive and responsible Bidder.

6.3.1.3 If failure to execute the Contract within 60 days of the bid opening is due to matters for which the Contractor is responsible, the Contracting Authority shall not grant a request for increased costs.

6.4 Notice to Proceed

6.4.1 The Contracting Authority shall issue a Notice to Proceed to the Contractor, which establishes the date for commencement and the calendar days allocated for Substantial Completion. Within 10 days of the date of the Notice to Proceed, or other period as mutually agreed by the Contractor and the Contracting Authority, the Contractor shall furnish the following submittals to the A/E:

6.4.1.1 Schedule of Values;

6.4.1.2 preliminary schedule of Shop Drawings and other Submittals;

6.4.1.3 Subcontractor and Material Supplier Declaration form, with completed "Bidder Affirmation and Disclosure" forms acknowledging that the Contractor affirms, understands, and will abide by the requirements of Executive Order 2019-12D and Executive Order 2022-02D for Subcontractors that were not identified in the **Bid Form**;

6.4.1.4 qualifications of proposed project manager(s) and superintendent(s) and a comprehensive resume of each; and

6.4.1.5 evidence that an authorization agreement for automatic deposit of state warrants has been submitted to Ohio Shared Services using the electronic funds transfer form provided on the Internet at http://supplier.ohio.gov.

6.5 Prevailing Wage Rates

6.5.1 The Bidder shall base its Bid upon the prevailing rates of wages as ascertained by the Ohio Department of Commerce, Wage and Hour Bureau for the Project as provided in ORC Sections 4115.03 through 4115.14. Refer to **Document 00 73 43 - Wage Rate Requirements** for related information and the Project's prevailing rates of wages with an appropriate ratio of registered apprentices.

6.5.2 The Bidder shall not be entitled to an increase in the Contract Sum on account of an increase in prevailing wage rates, except as otherwise provided by Applicable Law. The Bidder is responsible for compliance of its Subcontractors with prevailing wage requirements.

6.5.3 Within 10 days of the date of the Notice to Proceed, the Contractor shall provide the Contracting Authority's Prevailing Wage Coordinator with a schedule of dates during the term of the Contract when the Contractor shall pay wages to its employees for the Project.

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Document 00 41 13 - Bid Form (General Contracting Project)
State of Ohio Standard Requirements for Public Facility Construction

Sealed bids will be received by **NEOMED** at **4209 St. Rt. 44, Rootstown Ohio, 44272** for:

Project
QUIET STUDY SPACE

at

4209 St. Rt. 44
Rootstown, Ohio – Portage County

for

NEOMED

The time for Substantial Completion of all Work is ___ consecutive days from the Notice to Proceed.

Having read and examined the proposed Contract Documents prepared by the Architect/Engineer for the above-referenced Project and the following Addenda:

Addendum Number	Date Received
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

The undersigned Bidder proposes to perform all Work for the applicable Contract in accordance with the proposed Contract Documents, for the following sum(s):

Allowances – GENERAL CONTRACT

Allowance

Allowance amounts are fixed and no entry of data is required by the Bidder. Include each and every Allowance amount in the Base Bid. The Bidder's Fee (overhead and profit) and costs for unloading and handling on the Site, labor, installation costs, and other expenses contemplated for the Allowance must be included in the Base Bid and NOT in the Allowance amount.

Bid Package 101 – GENERAL CONTRACT

BASE BID (Including Allowances):

ALL LABOR AND MATERIALS, for the sum of $ _____

Sum in words: _____

_____and _____ /100 dollars.

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BIDDER AFFIRMATION AND DISCLOSURE

Bidder acknowledges that by signing the Bid Form on the Bidder Signature and Information page, that it has read and understands the applicable Executive Orders regarding the prohibitions of performance of offshore services, locating State data offshore in any way, or purchasing from Russian institutions or companies. If awarded a Contract, the Bidder will become the Contractor and affirms that both the Contractor and its Subcontractors shall perform no services requested under this Contract outside of the United States.

The Bidder shall provide the locations where services under this Contract will be performed in the spaces provided below or by attachment. Failure to provide this information as part of its Bid may cause the Bidder to be deemed non-responsive and no further consideration will be given to its Bid. If the Bidder will not be using Subcontractors, indicate "Not Applicable" in the appropriate spaces.

1. Principal business location of Contractor:

(Contractor Address)	(City, State, Zip)

Name / Principal location of business of Subcontractor(s), if known at time of Bid Opening:

(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)

2. Location where services will be performed by Contractor (Project Sites):

(Address)	(City, State, Zip)
(Address)	(City, State, Zip)

Name(s) / Location(s) where services will be performed by Subcontractors (Project Sites):

(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)

3. Location where State data will be located by Contractor:

(Address)	(City, State, Zip)

Locations where State data will be located by Subcontractor(s), if known at time of Bid Opening:

(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)
(Subcontractor Name)	(Address, City, State, Zip)

Bidder also affirms, understands and agrees that Bidder and its subcontractors are under a duty to disclose to the State any change or shift in location of services performed by Bidder or its subcontractors before, during and after execution of any Contract with the State. Bidder agrees it shall so notify the State immediately of any such change or shift in location of its services. The State has the right to immediately terminate the contract, unless a duly signed waiver from the State has been attained by the Bidder to perform the services outside the United States.

On behalf of the Bidder, I acknowledge that I am duly authorized to execute this Bid Form including this Bidder Affirmation and Disclosure form and have read and understand that this form is a part of any Contract that Bidder may enter into with the State and is incorporated therein.

COMMITMENT TO PARTICIPATE IN THE EDGE BUSINESS ASSISTANCE PROGRAM

Bidder: Mark only one option.
Use "✓" or "✗" to mark option included in Bid
If marking Option B, also show percentage of proposed participation.

___ **Option A**

Bidder commits to *meet or exceed* the advertised EDGE Participation Goal of **the Contract award amount,** calculated as a portion of the Base Bid plus all accepted Alternates, by using certified EDGE Business Enterprise(s).

Bidder agrees that if selected for consideration of the Contract, it shall provide (if not provided with the Bidder's Bid) to the Contracting Authority, at the location required and within 3 business days after receiving notice from the Contracting Authority, its fully completed ***Bidder's Qualification Form***, including an ***EDGE Affadavit*** form for each certified EDGE Business Enterprise proposed for use by the Bidder if awarded the Contract for this Project.

___ **Option B (also indicate percentage -- see text)**

Bidder *does not meet* the advertised EDGE Participation Goal percentage, but, if awarded the Contract for this Project, *commits to provide* _____ **percent of the Contract award amount**, calculated as a portion of the Base Bid plus all accepted Alternates, by using certified EDGE Business Enterprise(s).

Bidder acknowledges it understands the requirement for it to provide and agrees to provide to the Contracting Authority, if selected for consideration of the Contract, within 3 business days after notice from the Contracting Authority, a detailed ***Demonstration of Good Faith*** form describing its efforts undertaken prior to submitting its Bid to meet the advertised EDGE Participation Goal percentage for the Contract for this Project.

Bidder commits to provide to the Contracting Authority at the location required, and within 3 days after receiving notice from the Contracting Authority, its fully completed ***Bidder's Qualification Form***, including an ***EDGE Affadavit*** form for each certified EDGE Business Enterprise proposed for use by the Bidder if awarded the Contract for this Project.

___ **Option C**

Bidder declares that the Bidder is a certified EDGE Business Enterprise and that if awarded this Contract, the EDGE Participation percentage will be 100 percent of the Contract award amount.

BIDDER'S CERTIFICATIONS

The Bidder hereby acknowledges that the following representations in this Bid are material and not mere recitals:

1. The Bidder has read and understands the proposed Contract Documents and agrees to comply with all requirements of the proposed Contract Documents, regardless of whether the Bidder has actual knowledge of the requirements and regardless of any statement or omission made by the Bidder, which might indicate a contrary intention.

2. The Bidder represents that the Bid is based upon the Basis of Design and Acceptable Components specified by the proposed Contract Documents.

3. The Bidder has visited the Site, become familiar with local conditions, and has correlated personal observations about the requirements of the proposed Contract Documents. The Bidder has no outstanding questions regarding the interpretation or clarification of the proposed Contract Documents.

4. The Bidder understands that the execution of the Project will require sequential, coordinated, and interrelated operations, which may involve interference, disruption, hindrance, or delay in the progress of the Bidder's Work. The Bidder agrees that the Contract Sum, as amended from time to time, shall cover all amounts due from the State resulting from interference, disruption, hindrance, or delay that is not caused by the State or its agents and employees. The Bidder agrees that any such interference, disruption, hindrance, or delay is within the contemplation of the Bidder and the State and that the Contractor's sole remedy from the State for any such interference, disruption, hindrance, or delay shall be an extension of time in accordance with the proposed Contract Documents.

5. During the performance of the Contract, the Bidder agrees to comply with Ohio Administrative Code ("OAC") Chapters 123:2-3 through 123:2-9 and agrees to incorporate the monthly reporting provisions of OAC Section 123:2-9-01 into all subcontracts on the Project, regardless of tier. The Bidder understands the State's Equal Opportunity Coordinator or the Contracting Authority may conduct pre-award and post-award compliance reviews to determine if the Bidder maintains nondiscriminatory employment practices, maintains an affirmative action program, and is exerting good faith efforts to accomplish the goals of the affirmative action program. For a full statement of the rules regarding Equal Employment Opportunity in the Construction Industry, see OAC Chapters 123:2-1 through 123:2-9.

6. The Bidder and each Person signing on behalf of the Bidder certifies, and in the case of a Bid by a joint venture each member thereof certifies as to such member's entity, under penalty of perjury, that to the best of the undersigned's knowledge and belief: **(a)** the Base Bid, any Unit Prices, and any Alternate bid in the Bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition as to any matter relating to such Base Bid, Unit Prices or Alternate bid with any other Bidder; **(b)** unless otherwise required by law, the Base Bid, any Unit Prices and any Alternate bid in the Bid have not been knowingly disclosed by the Bidder and shall not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other Bidder who would have any interest in the Base Bid, Unit Prices or Alternate bid; **(c)** no attempt has been made or shall be made by the Bidder to induce any other Person to submit or not to submit a Bid for the purpose of restricting competition.

7. The Bidder understands that the Contract is subject to all the provisions, duties, obligations, remedies and penalties of Ohio Revised Code Chapter 4115 and that the Bidder shall pay any wage increase in the locality during the term of the Contract.

8. The Bidder shall execute the Agreement with the Contracting Authority, if a Contract is awarded on the basis of this Bid, and if the Bidder does not execute the Agreement for any reason, other than as authorized by law, the Bidder and the Bidder's Surety are liable to the State as provided in **Article 5** of the Instructions to Bidders.

9. The Bidder certifies that the upon the award of a Contract, as the Contractor it shall make a good faith effort to ensure that all of the Contractor's employees, while working on the Site, shall not purchase, transfer, use, or possess illegal drugs or alcohol or abuse prescription drugs in any way.

10. The Bidder acknowledges that it read all of the **Instructions to Bidders**, and in particular, **Section 2.10** - Submittals With Bid Form, and by submitting its Bid certifies that it has read the Instructions to Bidders and it understands and agrees to the terms and conditions stated in them.

11. The Bidder agrees to furnish any information requested by the Contracting Authority or Architect/Engineer to evaluate the responsibility of the Bidder.

12. The Bidder agrees to furnish the submittals required by **Section 6.1** of the **Instructions to Bidders** for execution of the Agreement within 10 days of the date of the Notice of Intent to Award.

13. When the Bidder is a corporation, partnership or sole proprietorship, an officer, partner or principal of the Bidder, as applicable, shall print or type the legal name of the Bidder on the line provided, and **sign the Bid Form**.

14. When the Bidder is a joint venture, an officer, partner or principal, as applicable, of each member of the joint venture shall print or type the legal name of the applicable member on the line provided, and **sign the Bid Form**.

15. Bidder acknowledges that by signing the Bid Form on the following Bidder Signature and Information page that it is signing the actual Bid and when submitted as a part of its bid package, shall serve as the Bidder's authorization for the further consideration and activity in the bidding and contract process.

16. All signatures must be original.

-- remainder of page left blank intentionally --

BIDDER SIGNATURE AND INFORMATION

Bidder's Authorized Signature: _____

Please print or type the following:

Name of Bidder's Authorized Signatory _____

Title: _____

Company Name: _____

Mailing Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

Email Address: _____

State of Incorporation: _____

Federal Tax ID Number: _____

Date enrolled in an OBWC-approved DFSP (month/date/year): _____ / _____ / _____

Contact person for Contract processing: _____

President's or Chief Executive Officer's Name / Title: _____

JOINT VENTURE ADDITIONAL BIDDER SIGNATURE & INFORMATION

Joint Venture Bidder's Authorized Signature: _____

Please print or type the following:

Name of Joint Venture Bidder's Authorized Signatory _____

Title: _____

Company Name: _____

Mailing Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

Email Address: _____

State of Incorporation: _____

Federal Tax ID Number: _____

Date enrolled in an OBWC-approved DFSP (month/date/year): _____ / _____ / _____

Contact person for Contract processing: _____

President's or Chief Executive Officer's Name / Title: _____

END OF DOCUMENT

Document 00 43 13 - Bid Security Form
State of Ohio Standard Requirements for Public Facility Construction

(Form of combined Bid Guaranty and Bond prescribed by Ohio Revised Code Section 153.571)

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____

_____, as Principal,

and _____ as Sureties,

are hereby held and firmly bound unto _____

_____ as Obligee(s), in the penal sum of the dollar amount of the Bid submitted by the Principal

to the Obligee on _____ (date) to undertake the Project known as:

Project Number: _____

Project Name: _____

Contract Description: _____
(e.g., General Contractor/Trades, Plumbing, HVAC, Electrical)

The penal sum, referred to herein, shall be the dollar amount of the Principal's Bid to the Obligee, incorporating any additive alternate Bids made by the Principal on the date referred to above to the Obligee, which are accepted by the Obligee. In no case shall the penal sum exceed the amount of dollars ($_____). (If the preceding line is left blank, the penal sum will be the full amount of the Principal's Bid, including add alternates. Alternatively, if completed, the amount stated shall not be less than the full amount of the Bid, including Alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above-named Principal has submitted a Bid for the above referenced Project;

NOW, THEREFORE, if the Obligee accepts the Bid of the Principal, and the Principal fails to enter into a proper contract in accordance with the Bid, Plans, Specifications, details, and bills of material; and in the event the Principal pays to the Obligee the difference, not to exceed ten percent of the penal sum hereof between the amount specified in the Bid and such larger amount for which the Obligee may in good faith contract with the Bidder determined by the Obligee to be the next lowest responsive and responsible to perform the Work covered by the Bid; or in the event the Obligee does not award the Contract to such next lowest responsive and responsible Bidder and resubmits the Project for bidding, the Principal pays to the Obligee the difference not to exceed ten percent of the penal sum hereof between the amount specified in the Bid, or the costs, in connection with the resubmission, of printing new Contract Documents, required advertising and printing and mailing notices to prospective Bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect. If the Obligee accepts the Bid of the Principal, and the Principal, within 10 days after the awarding of the Contract, enters into a proper contract and executes the Agreement Form in accordance with the Contract Documents, including without limitation the Bid, Plans, Specifications, details, and bills of material, which said Contract is made a part of this Bond the same as though set forth herein; and

NOW ALSO, IF THE SAID Principal shall well and faithfully perform each and every condition of such Contract; and indemnify the Obligee against all damage suffered by failure to perform such Contract according to the provisions thereof and in accordance with the Contract Documents, including without limitation Plans, Specifications, details, and bills of material therefore; and shall pay all lawful claims of Subcontractors, Material Suppliers and laborers for labor performed and materials furnished in the carrying forward, performing or completing of said Contract; we, agreeing and assenting that this undertaking shall be for the benefit of any Subcontractor, Material Suppliers or laborer having a just claim, as well as for the Obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

THE SAID Surety hereby stipulates and agrees that no modifications, omissions or additions, in or to the terms of said Contract, the Work thereunder or the Contract Documents, including without limitation the Plans and Specifications, therefore, shall in any way affect the obligations of said Surety on its bond, and it does hereby waive notice of any such modifications, omissions or additions in or to the terms of the Contract, the Work, or the Contract Documents, including without limitation the Plans and Specifications.

SIGNED AND SEALED this _____ day of _____ , _____ .

PRINCIPAL:

_____
Signature

By: _____
Name

_____
Title

SURETY:

_____
Signature

By: _____
Attorney-in-Fact

SURETY INFORMATION:

_____
Name

_____
Address 1

_____
Address 2

_____
City State Zip

_____
Telephone

_____
Email

SURETY AGENT'S INFORMATION:

_____
Name

_____
Address 1

_____
Address 2

_____
City State Zip

_____
Telephone

_____
Email

END OF DOCUMENT

Document 00 45 13 - Bidder's Qualifications
State of Ohio Standard Requirements for Public Facility Construction

Project Number: _____

Project Name: _____

1. **Company Name**: _____

   Physical Address: _____
   Street, Building, Unit

   _____
   City, State, Zip

   Mailing Address (if different): _____
   P.O. Box

   _____
   City, State, Zip

   Telephone Number (w/ Area Code): (_____) _____

   Fax Number (w/ Area Code): (_____) _____

   Email address: _____

2. **Overall Experience.** Indicate Bidder's overall experience performing the trades bid, including the years in business performing the trade under present and former business names.

3. **Financial.** The apparent low Bidder shall submit, upon request of the Contracting Authority, either:

   a) An annual financial statement prepared within the 12 months prior to the bid opening by an independent licensed accounting firm; and the name, address, contact person and phone number of the bank normally used by the Bidder for its primary banking; or,

   b) A financial report generated within 30 days prior to the bid opening from Standard and Poor, Dun and Bradstreet or a similar company acceptable to the Contracting Authority documenting the financial condition of the Bidder; and the name, address, contact person and phone number of the bank normally used by the Bidder for its primary banking;

   This information is not a public record under Ohio Revised Code Section 149.43; and shall remain confidential, except under proper order of a court.

4. **Facilities & Equipment**. Indicate Bidder's relevant facilities and major equipment (leased or owned).

5. **Ongoing & Relevant Projects.** List all ongoing projects and projects completed in the last 5 years, which are similar in cost and type to the Project. Include scope of Work, Contract value, a description of EDGE participation and performance, and project name/contact person/address/phone number for each owner and the architect or engineer for each project.

6. **Regulatory / Contractual.** Indicate all occurrences of the following in the last 5 years (indicate if none). For verification, attach documentation, and/or provide sufficient and appropriate detail information such as: project name, owner, contact person and phone number, amount of contract, etc.

    a) State or federal Prevailing Wage violations or judgments

    b) Affirmative Action and EDGE program violations (Attach Certificate of Compliance with Affirmative Action Programs, issued pursuant to Ohio Revised Code Section 9.47)

    c) Contract abandonment, contract termination, as either a prime- or sub-contractor, or Surety takeover

    d) Debarment by state, federal, or local jurisdictions

e) EPA/OSHA violations

f) Liquidated damages and Statutory Delay Forfeiture assessed

g) Drug-Free Safety Program and Drug Free Workplace Program violations

7. Management. Identify individuals assigned to this Project.

Principal _____ Years with firm _____ Total Exp._____

Project Manager _____ Years with firm _____ Total Exp._____

Field Superintendent _____ Years with firm _____ Total Exp._____

8. EDGE Participation. Identify EDGE-certified Business Enterprises proposed as Subcontractors and Material Suppliers for this Project. Attach a fully completed Document 00 45 39 - "EDGE Affidavit" for each EDGE-certified Business Enterprise.

9. Certification. I hereby certify that the information in this entire Bidder's Qualifications form, including all attachments and referenced information, is factual and complete.

Company Name _____

Authorized Official (please print or type) _____

Signature of Authorized Official _____ Date _____

END OF DOCUMENT

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ARTICLE 1 - CONTRACTOR'S RESPONSIBILITIES

1.1 Nondiscrimination

1.1.1 The Contractor shall comply with Applicable Law regarding equal employment opportunity, including ORC Section 153.59 and all Executive Orders issued by the Governor of the state of Ohio.

1.1.1.1 As required under ORC Section 153.59, the Contractor agrees to both of the following:

.1 "in the hiring of employees for the performance of work under the contract or any subcontract, no contractor, subcontractor, or any person acting on a contractor's or subcontractor's behalf, by reason of race, creed, sex, disability or military status as defined in section 4112.01 of the Revised Code, or color, shall discriminate against any citizen of the state in the employment of labor or workers who is qualified and available to perform the work to which the employment relates;" and

.2 "no contractor, subcontractor, or any person on a contractor's or subcontractor's behalf, in any manner, shall discriminate against or intimidate any employee hired for the performance of work under the contract on account of race, creed, sex, disability or military status as defined in section 4112.01 of the Revised Code, or color."

1.1.1.2 The Contractor shall cooperate fully with the State's Equal Opportunity Coordinator ("EOC"), with any other official or agency of the state or federal government that seeks to eliminate unlawful employment discrimination, and with all other state and federal efforts to assure equal employment practices under the Contract.

1.1.1.3 In the event the Contractor fails to comply with these nondiscrimination clauses, the Contracting Authority shall deduct from the amount payable to the Contractor a forfeiture of the statutory penalty pursuant to ORC 153.60 for each person who is discriminated against or intimidated in violation of this **Section 1.1.1**.

1.1.1.4 The Contract may be terminated or suspended in whole or in part by the Contracting Authority and all money to become due hereunder may be forfeited in the event of a subsequent violation of this **Section 1.1.1**.

1.1.2 Hiring Under State Public Improvement Contracts.

1.1.2.1 Any provision of a hiring hall contract or agreement which obligates the Contractor to hire, if available, only employees referred to the Contractor by a labor organization shall be void as against public policy and unenforceable with respect to employment under any public improvement contract unless at the date of execution of the hiring hall contract or agreement, or within 30 days thereafter, the labor organization has procedures in effect for referring qualified employees for hire without regard to race, color, religion, national origin, military status as defined in ORC Section 4112.01, or ancestry and unless the labor organization includes in its apprentice and

journeyman's membership, or otherwise has available for job referral without discrimination, qualified employees, both whites and non-whites (including African-Americans).

1.1.3 Affirmative Action.

1.1.3.1 The Contractor and Subcontractors shall comply with the State's Equal Employment Opportunity requirements described under OAC Sections 123:2-3 through 123:2-9 that include, without limitation, the requirements described under this **Section 1.1.3**.

1.1.3.2 The Contractor shall demonstrate its good-faith efforts to comply with the utilization goals currently established for minority and women employees and submit documentation to the EOC.

1.1.3.3 By the tenth day of each month, the Contractor and Subcontractors shall submit to the EOC via the internet a completed Ohio Construction Contract Information Report - Input Form 29 (I-29) for the preceding month. The form shall be submitted through the Ohio Business Gateway: http://business.ohio.gov/efiling/.

1.2 Prevailing Wages

1.2.1 The Contractor shall comply with the prevailing wage requirements described under ORC Chapter 4115 that include, without limitation, the requirements described under this **Section 1.2**.

1.2.2 If the Project is subject to payment of prevailing wage rates, the Contractor shall:

1.2.2.1 pay to laborers and mechanics performing Work on the Project the prevailing wage rates of the Project locality, as determined by the Ohio Department of Commerce, Wage and Hour Bureau;

1.2.2.2 post in a prominent place readily accessible by all workers on the Site, a legible listing of the current classifications of laborers, workers, and mechanics employed under this Contract;

1.2.2.3 ensure that the rates posted are current and remain posted in legible condition during the period of the Contract; and

1.2.2.4 not be entitled to an increase in the Contract Sum on account of an increase in prevailing wage rates, except as otherwise provided by Applicable Law.

1.2.3 The Contractor may access the Ohio Department of Commerce, Wage & Hour Bureau at its website, http://198.234.41.198/w3/webwh.nsf/pages/PrevailingWageBid, to obtain the current wage rates.

1.3 Royalties and Patents

1.3.1 The Contractor shall pay all royalties and license fees and assume all costs incident to the use, in the performance of the Work or the incorporation in the Work, of any invention, design, process, product, or device that is the subject of patent rights or copyrights held by others.

1.3.2 If the Contractor has reason to believe that use of the specified item is subject to patent or copyright protection, the Contractor shall immediately notify the Contracting Authority.

1.4 Assignment of Antitrust Claims

1.4.1 By signing the Agreement, the Contractor assigns, conveys and transfers to the Contracting Authority any right, title, and interest to any claims or causes of action it may have or acquire under state or federal antitrust laws relating to any goods, products, or services purchased, procured, or rendered to the State pursuant to the Contract.

1.5 Use of Domestic Steel

1.5.1 The Contractor is required by law to supply domestically produced steel products used for load bearing structural purposes on all projects funded in whole or in part with State funds.

1.5.2 The Contractor and Subcontractors shall comply with ORC Section 153.011 regarding the use of domestically produced steel products, and furnish the certifications required by **Section 6.19.8**. Copies of ORC Section 153.011 may be obtained from the Ohio Facilities Construction Commission or downloaded at http://codes.ohio.gov/orc/153.011v1.

1.6 Drug Free Safety Program Participation

1.6.1 Throughout the performance of the Work, the Contractor shall be enrolled in and remain in good standing in the Ohio Bureau of Workers' Compensation ("OBWC") Drug-Free Safety Program ("DFSP") or a comparable program approved by the OBWC that meets the requirements specified in ORC Section 153.03 ("OBWC-approved DFSP").

1.6.2 As required under ORC Section 153.03(E):

1.6.2.1 "Each contractor shall require all subcontractors with whom the contractor is in contract for the public improvement to be enrolled in and be in good standing in the Bureau of Workers' Compensation's Drug-Free Workplace Program or a comparable program approved by the Bureau that meets the requirements specified in section 153.03 of the Revised Code prior to a subcontractor providing labor at the project site of the public improvement."

1.6.2.2 "Each subcontractor shall require all lower-tier subcontractors with whom the subcontractor is in contract for the public improvement to be enrolled in and be in good standing in the Bureau of Workers' Compensation's Drug-Free Workplace Program or a comparable program approved by the Bureau that meets the requirements specified in section 153.03 of the Revised Code prior to a lower-tier subcontractor providing labor at the project site of the public improvement."

1.6.2.3 "Failure of a contractor to require a subcontractor to be enrolled in and be in good standing in the Bureau of Workers' Compensation's Drug-Free Workplace Program or a comparable program approved by the Bureau that meets the requirements specified in section 153.03 of the Revised Code prior to the time that the subcontractor provides labor at the project site will result in the contractor being found in breach of the contract and that breach shall be used in the responsibility analysis of that contractor or the subcontractor who was not enrolled in a program for future contracts with the State for five years after the date of the breach."

1.6.2.4 "Failure of a subcontractor to require a lower-tier subcontractor to be enrolled in and be in good standing in the Bureau of Workers' Compensation's Drug-Free Workplace Program or a comparable program approved by the Bureau that meets the requirements specified in section 153.03 of the Revised Code prior to the time that the lower-tier subcontractor provides labor at the project site will result in the subcontractor being found in breach of the contract and that breach shall be used in the responsibility analysis of that subcontractor or the lower-tier subcontractor who was not enrolled in a program for future contracts with the State for five years after the date of the breach."

1.6.3 Prior to authorizing a Subcontractor to commence Work on the Site, the Contractor shall obtain the Contracting Authority's approval, and shall also submit to the A/E written confirmation of the Subcontractor's enrollment on the **Subcontractor and Material Supplier Declaration** form.

1.6.4 In addition to OBWC-approved DFSP Basic requirements, the Contractor, each Subcontractor, and each Separate Contractor that provides labor on the Site shall participate in a pool that performs random drug testing of at least five percent of its employees who perform labor on the Site. The random drug testing percentage shall also include the on-site supervisors of the Contractor, Subcontractors, and Separate Contractors. Basic random drug testing shall otherwise comply with the same testing guidelines and criteria as required for OBWC-approved advanced testing. The Contractor and Subcontractor shall provide evidence of required testing to the Contracting Authority upon request.

1.7 Use of the State's Web-based Project Management Software

1.7.1 If the Contracting Authority decides, in its sole discretion, to utilize the State's web-based project management software for the Project, the Contractor shall use such software for all compatible services required under this Contract.

1.7.2 All costs for the Contractor's use of the State's web-based project management software for the Project shall be included in the Contract Sum. If the Contractor is unfamiliar with the proper use of such software, the Contractor shall provide its employees for training without additional compensation.

1.8 EDGE Participation and Reporting

1.8.1 The Contractor shall participate in the "Encouraging Diversity, Growth and Equity" ("EDGE") Program by subcontracting with, and using one or more, businesses certified as an EDGE Business Enterprise ("EDGE-certified Business") by the EOC.

1.8.1.1 If the Contractor is an EDGE-certified Business, the Contractor may include its own compensation under this Contract in the reporting.

1.8.1.2 The amount of EDGE participation cannot exceed 100 percent of the Contract Sum.

1.8.1.3 The Contractor shall include in the reporting only those expenditures to EDGE-certified Businesses that perform a commercially useful function as described in OAC Section 123:2-16-15.

1.8.2 The Contractor shall provide an EDGE Participation Report with each Contractor Payment Request.

1.8.2.1 The Contractor shall provide status reports, produced by the Contractor and each applicable EDGE-certified Business for the Contract, indicating:

- **.1** the name of each EDGE-certified Business;
- **.2** the federal tax identification number of each EDGE-certified Business;
- **.3** the date of the EDGE-certified Business contract, Subcontract, or purchase order;
- **.4** the projected and actual start and end dates of the EDGE-certified Business contract, Subcontract, or purchase order;
- **.5** the original amount of the EDGE-certified Business contract, Subcontract, or purchase order with the Contractor;
- **.6** the current amount of the EDGE-certified Business contract, Subcontract, or purchase order;
- **.7** the amount invoiced to date;
- **.8** the amount paid to date;
- **.9** the status of the EDGE-certified Business contract, Subcontract, or purchase order (active, complete, or void); and
- **.10** a statement describing any substantive product or performance deficiencies.

1.8.2.2 The Contractor shall provide reports for each EDGE-certified Business; however, the reports may be consolidated and submitted as one document.

1.8.3 The Contractor shall provide an EDGE Participation Final Report simultaneously with its final Contractor Payment Request.

1.8.3.1 The Contractor and each EDGE-certified Business shall provide in the report certification that the submitted document is a true and accurate accounting of the original contract amount paid to and, received by each EDGE-certified Business.

1.8.4 The Contractor shall provide the EDGE Participation Reports in detail and form acceptable to the Contracting Authority.

1.8.4.1 Failure to timely submit EDGE Participation Reports may result in withholding payment in accordance with **Section 9.8**.

1.8.5 The Contractor shall cooperate fully with requests for additional EDGE information and documentation from the EOC or Contracting Authority.

1.9 Owner Work Rules

1.9.1 The Contractor shall consult with the Owner to obtain full knowledge of the Owner's rules, regulations, or requirements affecting the Project.

1.10 Emergency

1.10.1 In the event of an emergency affecting the safety of the Project, other property, or individuals, the Contractor, without special instruction or authorization, shall act to prevent the threatened damage, injury, or loss.

1.10.2 If the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of its actions in response to an emergency, the Contractor may request a Modification by giving written notice under **Section 7.3.2**.

1.11 Contractor's Standard of Care

1.11.1 The Contractor shall perform the Work in a workmanlike manner, consistent with the standards of skill and care exercised by entities licensed to perform (where required under Applicable Law) and regularly performing comparable work in the same or similar locality under the same or similar circumstances.

1.12 Limit of Contractor's Responsibility

1.12.1 The Contractor is not responsible for the A/E's negligence or the A/E's failure to properly perform the A/E's contract.

1.13 Sustainability Requirements

1.13.1 This Project shall be designed and constructed in accordance with the requirements of Am. Sub. H.B. 251 of the 126th General Assembly and the resulting rules, policies, and procedures adopted by the Ohio Facilities Construction

Commission establishing Sustainability Requirements for Capital Improvements Projects, including but not limited to the applicable provisions of OAC 3318-3.

1.13.2 If the Project is designed and constructed under the Leadership in Energy and Environmental Design ("LEED") Rating System developed by the U.S. Green Building Council or another rigorous rating system used to facilitate achievement of sustainability goals for the Project, the Contractor shall provide submittals certifying achievement of sustainable design rating system criteria for verification by the Green Building Certification Institute or other third party in accordance with the Contract Documents.

ARTICLE 2 - STATE'S RIGHTS AND RESPONSIBILITIES

2.1 Contracting Authority

2.1.1 The Contracting Authority shall designate a Project Manager for the Project. The Project Manager is authorized to act on behalf of the Contracting Authority to perform specific responsibilities under the Contract.

2.1.2 The Contracting Authority shall furnish information and services required of it in a timely manner.

2.1.3 The Contracting Authority shall have access to the Work at all times, whenever the Project is in preparation or progress.

2.1.4 The Ohio Facilities Construction Commission requires use of its forms where indicated in the Contract Documents. The party responsible for initiating forms shall utilize the latest edition obtained from the Commission's website: https://ofcc.ohio.gov. The Commission may make modifications to its forms at any time.

2.1.4.1 The Contractor shall not modify any form provided by the Commission or Contracting Authority.

2.1.4.2 If the Project is administered using the State's web-based project management software, the Contractor shall utilize the web-based forms and reports within the applicable business process. The State's web-based project management software is sponsored by the Commission, and such web-based forms and reports are acceptable to the Commission in lieu of its paper forms.

2.1.5 The Contracting Authority is not responsible for construction means, methods, manners, techniques, sequences, procedures, or for safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in conformity with the Contract Documents.

2.2 Owner

2.2.1 The Owner shall designate a representative authorized to act on behalf of the Owner during the Project.

2.2.2 The Owner shall furnish information and services required of it in a timely manner.

2.2.3 The Owner shall have access to the Work at all times whenever the Project is in preparation or progress.

2.2.4 Upon issuance of the Notice to Proceed, the Owner shall provide the Site to the Contractor in a condition to permit the Contractor to perform the Work.

2.2.5 The Owner may request a change in the Work if the A/E recommends and the Contracting Authority approves the change.

2.2.6 The Owner shall communicate with the Contractor through the Contracting Authority.

2.2.7 The Owner is not responsible for construction means, methods, manners, techniques, sequences, procedures, or for safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in conformity with the Contract Documents.

2.3 Approval of Owner, Contracting Authority, and State

2.3.1 The Owner, Contracting Authority, or State's review and approval of the Work and any information the Contractor submits to them is for the sole purpose of determining whether the Work and information are generally consistent with the Contract's intent, and will not relieve the Contractor of its sole responsibility for the performance, preparation, completeness, and accuracy of the Work and information.

2.4 Neutral Facilitation

2.4.1 The Contracting Authority or Owner may engage a Neutral Facilitator for the purposes of **(1)** building cooperative relationships among the Project participants to achieve discrete objectives; **(2)** encouraging educated, productive, and

expedited attempts to avoid, minimize, and resolve disputes; and **(3)** maximizing the effectiveness of each participant's resources.

2.4.1.1 For example, a Neutral Facilitator may facilitate the organizational meeting, partnering session(s), and efforts to resolve disputes throughout the Project.

2.4.2 The Contracting Authority, Owner, and Contractor are entitled to interact with the Neutral Facilitator with the full expectation that **(1)** they may act, speak, and disclose information with complete candor and **(2)** all communication, whether oral or written, made in the course of facilitated sessions is confidential.

2.4.3 At any hearing or proceeding regarding any dispute arising out of or related to the Project **(1)** the Neutral Facilitator will not be competent to testify and shall not be called as a witness and **(2)** the Neutral Facilitator's testimony and work product will not be admissible.

2.4.4 The Neutral Facilitator will not **(1)** perform any services with respect to or bear any responsibility for any legal services, design-professional services, construction, or construction management associated with the Project or **(2)** have any liability whatsoever for any claims related to any legal services, design-professional services, construction, or construction management associated with the Project, including without limitation, claims for legal or design-professional errors or omissions, delays, cost overruns, faulty construction, or increased costs.

2.4.5 The Neutral Facilitator's participation in the Project will not relieve the Contracting Authority, Owner, and Contractor of any of their respective rights or obligations under the Contract.

2.5 Contractor Performance Evaluation

2.5.1 The Contracting Authority may evaluate the Contractor's performance during the progress of the Work, at completion of a phase of the Project, completion of the Project, or any of the foregoing. The Contracting Authority shall retain the evaluation(s).

2.5.1.1 The Contractor may request a copy of the completed evaluation(s). If the Contractor wishes to comment or take exception to any rating or remark, the Contractor must send a response in writing to the Contracting Authority within 30 days of receiving the evaluation(s).

2.5.1.2 The Contracting Authority may use the evaluation(s) in determining the responsibility of the Contractor for award of future contracts.

2.5.1.3 The Contracting Authority may request information from the Contractor for use in evaluating the A/E's performance. If information is requested, the Contractor must comply in a timely and responsive manner.

2.5.1.4 If a breach of the Contract is committed by the Contractor or is attributable to a Subcontractor, that breach will be used in the responsibility analysis of the Contractor and Subcontractor (where applicable) for future contracts with the State or subcontracts on State projects for five years after the date of the breach.

ARTICLE 3 - A/E'S RESPONSIBILITIES

3.1 The A/E's Contract Administration Duties

3.1.1 The A/E shall administer the Contract as provided in the Contract Documents and Architect/Engineer Agreement, including, but not limited to, performance of the functions described as follows:

3.1.1.1 The A/E shall attend and conduct progress meetings. The A/E shall prepare an agenda and produce a written report of each progress meeting, and distribute the report to the Contracting Authority, Owner, and Contractor within three business days after the meeting. The A/E shall not delegate the duty to prepare the agenda and written reports of any progress meeting.

3.1.1.2 The A/E may authorize minor changes or alterations in the Work that are consistent with the intent of the Contract Documents and do not involve adjustment of the Contract Sum or Contract Times, or both. The A/E has no authority to authorize the Contractor to perform additional or extra Work for which the Contractor may seek adjustment of the Contract Sum or Contract Times, or both.

3.1.1.3 The A/E shall review and recommend, certify, or approve applicable forms required under the Contract Documents.

3.1.1.4 The A/E shall render decisions in connection with the Contractor's responsibilities under the Contract Documents, and submit recommendations to the Contracting Authority for enforcement of the Contract as necessary.

3.1.2 The A/E is the initial interpreter of all requirements of the Contract Documents. All decisions of the A/E are subject to final determination by the Contracting Authority.

3.2 Site Visits and Observation

3.2.1 The A/E shall notify, advise, and consult with the Contracting Authority and Owner and protect the State against Defective Work throughout completion of the Project, which includes the Correction Period.

3.2.1.1 The A/E shall designate a field representative, subject to the Contracting Authority's approval, to attend to the Project, to observe and check the progress and quality of the Work, and to take action as necessary or appropriate to achieve conformity with the Contract Documents.

3.2.1.2 The A/E shall have its consultants attend to the Project at intervals required by its agreement or the Contracting Authority.

3.2.2 The A/E is authorized to disapprove or reject Defective Work. The A/E shall immediately notify the Contracting Authority any time the A/E disapproves or rejects an item of Work.

3.2.3 The A/E is not responsible for construction means, methods, manners, techniques, sequences, procedures, or for safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in conformity with the Contract Documents.

3.3 Testing and Inspection Services

3.3.1 Unless otherwise specified in the Contract Documents, the A/E shall apply for, secure, and pay for the costs of structural testing and special inspections under Chapter 17 of the Ohio Building Code; testing including geotechnical analysis, environmental testing and analysis, concrete, masonry, structural steel, reinforcing steel, welding, bolts, steel connections, HVAC systems and controls, plumbing and piping, air and water balancing and testing, or other testing; or approval required by Applicable Law.

3.4 Approval of A/E

3.4.1 The A/E's review and approval of the Work and any information the Contractor submits to the A/E is for the sole purpose of determining whether the Work and information are generally consistent with the Contract's intent, and will not relieve the Contractor of its sole responsibility for the performance, preparation, completeness, and accuracy of the Work and information.

3.5 Limitation of A/E's Authority

3.5.1 Under no circumstances is the A/E authorized to:

3.5.1.1 bind the Owner or Contracting Authority to any authorizations under, modifications of, or amendments to any contract other than as expressly described under **Section 3.1.1.2**;

3.5.1.2 accept any defective or non-conforming services, Work, or vendor-furnished items;

3.5.1.3 make any settlements on behalf of the Owner or Contracting Authority; or

3.5.1.4 assume any responsibilities of the Contractor or Subcontractors.

ARTICLE 4 - SUBCONTRACTORS

4.1 Evaluation and Approval

4.1.1 Within ten days after the Notice to Proceed, or other period as mutually agreed by the Contractor and Contracting Authority, the Contractor shall submit to the A/E a **Subcontractor and Material Supplier Declaration** form through which the Contractor identifies its Subcontractors.

4.1.2 The Contractor's failure to timely submit the information regarding a proposed Subcontractor may result in withholding payment in accordance with **Section 9.8**.

4.1.3 After receiving the **Subcontractor and Material Supplier Declaration** form, the A/E shall verify that it is complete and deliver it to the Contracting Authority and Owner. If the A/E finds the form incomplete, the A/E shall return it to the Contractor and identify the incomplete information.

4.1.4 If the Contracting Authority rejects any proposed Subcontractor, the Contractor shall propose a replacement Subcontractor with no adjustment of the Contract Sum. The proposed replacement Subcontractor will be evaluated as described above.

4.1.5 No less than ten days before Work is to be performed by the Subcontractor, or within a shorter period as mutually agreed by the Contractor and Contracting Authority, the Contractor shall submit to the Contracting Authority a complete copy of the executed Subcontract between the Contractor and Subcontractor.

4.2 Form of Subcontract

4.2.1 All Subcontracts shall be on the **State of Ohio Subcontract Form** prescribed by OAC Section 153:1-03-02.

4.2.2 No less than ten days before Work is to be performed by a Subcontractor, or within a shorter period as mutually agreed by the Contractor and Contracting Authority, the Contractor shall submit to the Contracting Authority and A/E a complete copy of the executed Subcontract between the Contractor and Subcontractor. After receiving the Subcontract, the A/E shall verify that it is complete and deliver it to the Contracting Authority. If the A/E finds the Subcontract incomplete, the A/E shall return it to the Contractor and identify the incomplete information.

4.3 Replacement of Subcontractors

4.3.1 The Contractor shall not replace any Subcontractor after execution of the Subcontract without the prior written approval of the Contracting Authority.

4.4 Contractor's Responsibility

4.4.1 The Contractor is fully responsible for all acts and omissions of its Subcontractors and is responsible for scheduling and coordinating the Work of its Subcontractors.

4.4.1.1 The Contractor is fully responsible for any delay, interference, disruption, or hindrance attributable to the Contractor's Subcontractors.

4.4.1.2 The Contractor shall require that each of its Subcontractors have a competent supervisor at the Site whenever the Subcontractor is performing Work.

4.4.1.3 The Contractor shall bind its Subcontractors to the terms of the Contract Documents, so far as applicable to the Work of the Subcontractor.

4.4.1.4 The Contractor shall not agree to any provision, which seeks to bind the State to terms inconsistent with or at variance from the Contract Documents.

4.4.2 The Contractor will not be relieved of its full responsibility for Subcontractors and their performance of the Work by **(1)** the participation of the Owner, Contracting Authority, and A/E in the processes described under this **Article 4** or other related provisions of the Contract Documents or **(2)** the Contracting Authority's rejection of a Subcontractor or failure to reject a Subcontractor under **Section 4.1**.

4.5 Contingent Assignment of Subcontracts

4.5.1 The Contractor hereby assigns its agreement with each Subcontractor to the Contracting Authority provided that the assignment is effective only after termination of the Contract in whole or in part by the Contracting Authority and only for those agreements that the Contracting Authority accepts by notifying the Contractor and applicable Subcontractors in writing. The Contracting Authority may re-assign accepted agreements.

4.5.1.1 If the Contracting Authority terminates the Contract in part, the Contracting Authority may **(1)** take assignment of any entire Subcontract affected by the termination or **(2)** take partial assignment of only the portion of any Subcontract associated with the terminated part of the Contract.

4.6 Prompt Payment

4.6.1 The Contractor shall make payments to Subcontractors in accordance with Applicable Law, including ORC Section 4113.61.

4.6.2 The Contractor may reduce the amount paid to a Subcontractor pursuant to **Section 4.6.1** at a rate equal to the percentage retained from the Contractor and may withhold amounts necessary to **(1)** resolve disputed liens or claims involving the Work of the Subcontractor or **(2)** account for the failure of the Subcontractor to perform its obligations under its agreement with the Contractor.

ARTICLE 5 - PRECONSTRUCTION ACTIVITIES

5.1 Partnering

5.1.1 The formation of a cohesive, mutually beneficial partnering arrangement among the Contractor, Contracting Authority, A/E, and Owner will accomplish the construction of the Project most effectively and efficiently. This arrangement draws on their collective strengths, skills, and knowledge to achieve a Project of the intended quality, within budget, and on schedule. To achieve that objective, participation in a partnering session is required for the following key stakeholders:

5.1.1.1 Contracting Authority: Project Manager

5.1.1.2 Owner: Primary representative

5.1.1.3 A/E: Principal-in-charge, project manager, field representative, major consultants

5.1.1.4 Contractor: Principal-in-charge, project manager, and superintendent

5.1.1.5 Major Subcontractors (e.g., plumbing, HVAC, electrical): Principal-in-charge, project manager or superintendent

5.1.1.6 CxA, if applicable

5.1.2 The purpose of the partnering arrangement is to build cooperative relationships between the Project's key stakeholders, avoid or minimize disputes, and nurture a more collaborative ethic characterized by trust, cooperation and teamwork. This arrangement is intended to produce a voluntary, non-binding, but formally structured agreement among the Project's key stakeholders, leading to an attitude that fosters risk sharing.

5.1.3 To create and implement the partnering arrangement, the Project's key stakeholders shall meet prior to the construction of the Project for developing a partnering agreement. The agreement should be comprehensive and focus on all issues necessary for successful completion of the Project, and shall identify common goals and objectives, develop a problem solution process, an Alternative Dispute Resolution ("ADR") strategy in accordance with **Section 8.13**, and an implementation plan for the partnering arrangement.

5.1.4 Formal contractual relations, responsibilities, and liabilities are not affected by any partnering arrangement. The cost associated with establishing this partnership, including but not limited to engaging the services of a Neutral Facilitator, shall be included in an allowance in the Contractor's bid. The Contractor shall include in its base bid the resources necessary to participate in the partnering session.

5.1.5 Partnering services may extend over the entire period of performance of the Contract and may include intervention or project realignment services to be utilized if serious disputes arise. The Project's key stakeholders should agree, during the initial partnering session, to the types of situations and circumstances in which intervention or realignment services shall be utilized.

5.2 Building and Trade Permits and Licenses

5.2.1 Plan Approval.

5.2.1.1 The A/E shall secure the required structural, plumbing, HVAC, and electrical plan approvals.

5.2.1.2 The Contractor shall schedule and attend all intermediate and final inspections required for any permit applicable to the Work. The Contractor shall schedule the State Fire Marshal or local fire authority for the life safety inspection for occupancy permits. The Contractor shall give the A/E, Contracting Authority, and Owner reasonable notice of the dates and times arranged for inspections.

.1 The Contractor shall pay for any reinspections required as a result of the Contractor's failure to receive approval of its Work.

5.2.2 Trade Permits and Licenses.

5.2.2.1 The Contractor shall obtain, maintain, and pay for any permit, inspection, or license applicable to the Contractor's particular trade.

5.2.3 Local Permits.

5.2.3.1 The Contractor shall secure and pay the fees for any permits, inspections, licenses, capacity charges, or tap fees required by local authorities having jurisdiction over the Project. The Contractor shall give the A/E, Contracting Authority, and Owner reasonable notice of the date arranged for inspections.

5.2.4 National Pollutant Discharge Elimination System ("NPDES") Storm Water General Permit.

5.2.4.1 The A/E shall secure the NPDES general permit by submitting a Notice of Intent ("NOI") application form to the Ohio Environmental Protection Agency at least 45 days prior to the start of construction. The Contractor shall be a "co-permitee" if required under Applicable Law.

5.2.4.2 The A/E shall prepare and certify a storm water pollution prevention plan to provide sedimentation and erosion controls at the Project.

5.2.4.3 The A/E shall prepare and process the required Notice of Termination ("NOT") prior to Contract Completion.

ARTICLE 6 - CONSTRUCTION AND CLOSEOUT

6.1 Commencement of Work on the Site

6.1.1 Unless the Contracting Authority agrees otherwise in writing, the Construction Stage will commence with the Contracting Authority's issuance of the Notice to Proceed and will terminate upon Contract Completion.

6.2 Responsibility of the Contractor

6.2.1 The Contractor shall complete portions of the Work in the sequence and time in the Construction Progress Schedule.

6.2.2 The Contractor shall supervise the Work.

6.2.3 The Contractor must perform the Work so as not to interfere with, disturb, hinder, or delay the services of Separate Consultants or the work of Separate Contractors. The Contractor must cooperate and coordinate fully with all Separate Consultants and Separate Contractors and must freely share all of the Contractor's Project-related information with them to facilitate the timely and proper performance of the Work and of the services and work of the Separate Consultants and Separate Contractors.

6.2.4 The Contractor must afford every Separate Consultant and Separate Contractor proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of their services and work.

6.2.5 If the Contractor damages the property or work of any Separate Consultant or Separate Contractor, or by failure to perform the Work with due diligence, delays, interferes with, hinders, or disrupts the services of any Separate Consultant or the work of any Separate Contractor who suffers additional expense and damage as a result, the Contractor is responsible for that damage, injury, or expense.

6.2.6 The intent of **Sections 6.2.3** through **6.2.5** is to benefit the Separate Consultants and Separate Contractors, and to demonstrate that the Separate Consultants and Separate Contractors are intended third-party beneficiaries of the Contractor's obligations under the Contract.

6.2.7 If the proper execution or results of any part of the Work depends upon work performed or services provided by the Owner, a Separate Consultant, or a Separate Contractor, the Contractor must inspect that other work and appropriate instruments of service, and promptly report to the Contracting Authority in writing any defects or deficiencies in that other work or services that render it unavailable or unsuitable for the proper execution and results of the Work. The Contractor's failure to report before starting the affected part of its Work will constitute an acceptance of the other work and services as fit and proper for integration with the Contractor's Work except for defects and deficiencies in the other work or services that were not reasonably discoverable at the time of the Contractor's inspection.

6.2.8 The Contractor shall not delay the Work on account of any claim, dispute, or action between the Contractor and a Separate Consultant or Separate Contractor.

6.2.9 The Contractor shall develop and keep current the Construction Progress Schedule in accordance with **Section 6.5**, and prepare and keep current a schedule of submittals that is coordinated with the Construction Progress Schedule, for the A/E and Contracting Authority's acceptance.

6.2.10 The Construction Progress Schedule shall not exceed the time limits current under the Contract Documents, shall provide for reasonable, efficient, and economical execution of the Project, and shall relate to the entire Project to the extent required by the Contract Documents.

6.2.11 The Contractor shall use the Construction Progress Schedule to plan, organize, and execute the Project, record and report actual performance and progress, and show how it plans to coordinate and complete all remaining work by Contract Completion.

6.2.12 The Contractor shall monitor the progress of the Work for conformance with the Construction Progress Schedule and shall initiate revisions as required by **Section 6.5.14**.

6.2.13 The Contractor shall establish the Project's regular working hours, subject to approval by the A/E and the Owner.

6.2.14 The Contractor shall coordinate the Work with the activities and responsibilities of the A/E, Owner, and Contracting Authority to complete the Project in accordance with the Contract Documents.

6.2.15 In the event of default of the Contractor, the Contractor shall cooperate with the A/E, Contracting Authority, and Contractor's Surety to achieve the Substantial Completion date and Contract Completion.

6.2.16 The Contractor shall remove all snow and ice as may be required for reasonably safe access to the Project including, but not limited to, building entries, driveways, parking lots, and sidewalks.

6.2.17 The Contractor shall keep a daily log containing a record of weather, number of workers on Site, identification of equipment, Work accomplished, problems encountered, and other similar relevant data.

6.3 Construction Procedures

6.3.1 The Contractor is solely responsible for and has control over all construction means, methods, manners, techniques, sequences, and procedures, for safety precautions and programs in connection with the Work, and for coordinating all portions of the Work.

6.3.1.1 If the Contract Documents give instructions that affect construction means, methods, manners, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety of them and, except as stated below, shall be fully and solely responsible for the jobsite safety of the means, methods, manners, techniques, sequences, or procedures.

6.3.1.2 If the Contractor determines that the means, methods, manners, techniques, sequences, or procedures specified in the Contract Documents may not be safe, the Contractor shall give timely written notice to the A/E, Owner, and Contracting Authority. The Contractor shall not proceed with that portion of the Work without further written instructions from the A/E. Any modification of the Contract shall be in accordance with **Article 7**.

6.3.2 The Contractor shall lay out and coordinate all lines, levels, elevations, and measurements for all of the Work, coordinate and verify existing conditions, and notify the A/E of discrepancies and conflicts before proceeding with installation or excavation.

6.3.3 The Contractor shall perform all cutting, fitting, or patching required for the Work and shall not endanger the Project by cutting, excavating, or otherwise altering the Project, or any part of it.

6.3.3.1 If the Contractor requires sleeves for the Work, the Contractor shall furnish and install the sleeves. The Contractor is responsible for the exact location and size of all holes and openings required to be formed or built for the Work.

6.3.3.2 The Contractor's patching shall match and blend with the existing or adjacent surface(s).

6.3.4 The Contractor shall comply with ORC Sections 3781.25 through 3781.32. In addition, before starting excavation or trenching, the Contractor shall determine the location of any underground utilities and notify any public authority or utility having jurisdiction over the Project and secure any required approval.

6.3.5 The Contractor shall install all Work in accordance with the Contract Documents and any installation recommendations of the manufacturer, including required temperature and humidity limits for installation of the various materials.

6.3.6 The Contractor shall comply with all requirements and conditions of the NPDES general permit, including, but not limited to, implementing and maintaining the sedimentation and erosion control measures specified in the storm water pollution prevention plan prepared by the A/E pursuant to **Section 5.2.4**, which are related to the Work, maintaining records of its construction activities, removing materials no longer required, and taking proper action if there is a reportable quantity spill.

6.3.7 The Contractor shall communicate with the Contracting Authority and Owner through the A/E.

6.4 Construction Supervision

6.4.1 Unless waived by the Contracting Authority in writing, the Contractor shall provide continuous supervision at the Site by a competent superintendent when any Work is being performed, and the Contractor's superintendent shall not be involved with any work other than the Project.

6.4.2 The Contractor's project manager and superintendent shall each have the responsibility and authority to act on behalf of the Contractor. All communications to the Contractor's project manager or superintendent shall be binding as if given directly to the Contractor.

6.4.3 The Contractor shall submit an outline of the qualifications and experience of the Contractor's proposed project manager and proposed superintendent, including references, to the Contracting Authority no less than ten days of the Notice to Proceed. For all Subcontracts in excess of $200,000, and for all other Subcontracts on request from the Contracting Authority, the Contractor shall submit an outline of the qualifications and experience of the Subcontractor's proposed project manager and proposed superintendent, including references, to the Contracting Authority no less than ten days before the Subcontractor is scheduled to begin Work on the Site.

6.4.3.1 The Contracting Authority may reject the Contractor or Subcontractor's proposed project manager or proposed superintendent. If the Contracting Authority does not notify the Contractor of the rejection within 30 days after receiving the required information, it shall indicate that the Contracting Authority has no objection, but does not affect the Contracting Authority's rights under **Section 6.11.2** or any other provision relative to that project manager or superintendent.

6.4.3.2 If the Contracting Authority rejects the Contractor or Subcontractor's proposed project manager or proposed superintendent, the Contractor shall replace, or cause the Subcontractor to replace the project manager or superintendent (as appropriate) with someone acceptable to the Contracting Authority at no additional cost.

6.4.4 The Contractor and its Subcontractors shall not replace their respective project managers or superintendents without prior written approval of the Contracting Authority.

6.4.4.1 If the Contractor or a Subcontractor proposes to change its project manager or superintendent, the Contractor shall submit written justification to the Contracting Authority, along with the name and qualifications of the proposed replacement.

6.4.4.2 The procedure provided in **Section 6.4.3** shall be conducted to evaluate the Contractor or Subcontractor's (as applicable) proposed replacement project manager or superintendent.

6.5 Construction Progress Schedule

6.5.1 If the Estimated Construction Cost is less than $500,000, the Contractor may provide a bar chart schedule with a logical sequence of events and sufficient detail to properly anticipate and monitor construction progress. If the Estimated Construction Cost for the Project is $500,000 or more, the Contractor shall prepare and maintain a resource-loaded Construction Progress Schedule using the critical-path method of scheduling that provides the following information:

6.5.1.1 a graphic presentation of the sequence of the Work for the Project in the media and format required for the Project;

6.5.1.2 identification of each stage of the Work and any Milestone dates;

6.5.1.3 identification of activities and durations for review and approval of Shop Drawings and other action submittals, fabrication and review of mock-up Work, product review and procurement, fabrication, shop inspection, and delivery, including, but not limited to, lead time, coordination drawing delivery, Substantial Completion, Punch List, Punch List Correction, Project close-out requirements, occupancy requirements, and Contract Completion;

6.5.1.4 identification of disruptions and shutdowns due to other operations;

6.5.1.5 identification of the critical path of the Work;

6.5.1.6 identification of the crew size and total resource hours for each activity in the schedule; and

6.5.1.7 the Contractor's signature and date indicating approval.

6.5.2 The Contractor shall develop the Construction Progress Schedule using commercially available, personal computer software acceptable to the Contracting Authority and shall submit all baseline and updated schedules to the A/E in the schedules' native electronic format.

6.5.3 The Construction Progress Schedule shall not exceed the time limits current under the Contract Documents, shall provide for reasonable, efficient, and economical execution of the Project, and shall relate to the entire Project to the extent required by the Contract Documents.

6.5.4 The Contractor shall use the Construction Progress Schedule to plan, organize, and execute the Project, record and report actual performance and progress, and show how it plans to coordinate and complete all remaining Work within applicable Milestones. The Project participants shall use the Construction Progress Schedule as a tool for scheduling and reporting sequenced progress of the Work. The Contractor shall provide a clear graphics legend and other data including, but not limited to, Milestone dates, constraints, and other items required by the Project, A/E, Contracting Authority, and Owner. Each submission shall show the Contracting Authority's Project number and Project name, and provide a signature approval and date line for the Contractor.

6.5.5 The Contractor shall provide in each schedule: Activity identification and description for each activity broken down to a maximum duration that is appropriate for the activity, responsibility of the Contractor, Contractor's resources and crew size for each activity, provide early start, early finish, late start, late finish dates. Each schedule shall show predecessor activities and successor activities for each activity, entry free float, total float, and percentage of completion, and identify the appropriate predecessors and successors for all related activities.

6.5.6 The Construction Progress Schedule shall show all submittal dates, review and approval durations for coordination drawings, Shop Drawings, other action submittals, and mock-up Work.

6.5.7 Within 30 days of the date of the Notice to Proceed, the Contractor shall submit to the A/E a proposed Construction Progress Schedule approved by the Contractor. If the Project is $4 million total construction cost or more, the Contractor may submit an intermediate Bar Chart Schedule for the first 120 days to the A/E within 30 days of the date of the Notice to Proceed; followed by the complete resource-loaded precedence or arrow diagram schedule within 90 days of the date of the Notice to Proceed.

6.5.7.1 The Contractor shall submit the initial and all updates of the Construction Progress Schedule in graphic and tabular form to the A/E. With each monthly schedule update, the Contractor shall include a list of all changes to the previously approved baseline schedule or monthly updated schedule.

6.5.7.2 After receiving the Construction Progress Schedule, the A/E shall review and submit a copy of the Construction Progress Schedule to the Contracting Authority and Owner for review and acceptance, or reject and return it to the Contractor with recommendations for revisions.

6.5.8 The Construction Progress Schedule shall be managed using early start dates and early finish dates. The Contractor must exhaust existing float before claiming additional time for a Change Order, or show that it is not possible to use float to cover the time requirements of the Change Order.

6.5.9 The Contractor's failure to timely submit and properly maintain an approved Construction Progress Schedule may result in withholding payment in accordance with **Section 9.8**.

6.5.10 For each progress meeting, the Contractor shall provide a two- to six-week look-ahead schedule, as appropriate for the Project.

6.5.11 On a weekly basis, the Contractor shall prepare and submit to the A/E a written report describing:

6.5.11.1 activities begun or finished during the preceding week;

6.5.11.2 activities in progress and expected completion;

6.5.11.3 activities to be started or finished in the upcoming two weeks, including but not limited to, the Contractor's workforce size and total resource hours associated with those activities; and

6.5.11.4 other information requested by the A/E.

6.5.12 The A/E shall attach the above information to the minutes of the weekly progress meetings.

6.5.13 The Contractor shall provide monthly Progress Status Reports to the Contracting Authority, A/E, and Owner, which shall include recommendations for adjusting the Construction Progress Schedule to meet Milestone dates and the Substantial Completion date.

6.5.13.1 If it is apparent to the A/E that the Contractor may be unable to meet critical path activities, Milestone completion dates, or the Substantial Completion date, the A/E shall direct the Contractor to submit within three days a recovery plan to avoid or minimize delay to the Project.

6.5.13.2 A recovery plan shall include, but is not limited to, adjustments to one or more of the following:

.1 workforce;

.2 hours per shift;

.3 shifts per workday;

.4 workdays per week;

.5 equipment;

.6 activity logic.

6.5.13.3 If the A/E approves the recovery plan, the Contractor shall prepare a revised Construction Progress Schedule approved in accordance with **Section 6.5.7**. If the A/E does not approve the recovery plan, the Contractor shall submit within three days an alternate recovery plan to the A/E in writing for review and approval in accordance with **Section 6.5.7**.

6.5.14 The Contractor shall update the Construction Progress Schedule on a monthly basis, or other interval approved by the Contracting Authority, in accordance with **Section 6.5.7**.

6.5.14.1 The updated Construction Progress Schedule approved by the Contractor shall serve as an affirmation that the Contractor can meet the requirements of the updated Construction Progress Schedule.

6.5.14.2 The Contractor shall submit a tabular copy showing all changes to the previously approved schedule including, but not limited to, logic, float, and actual start date of activities. The original or initially approved Construction Progress Schedule and all subsequent Construction Progress Schedules submitted by the Contractor, and accepted by the A/E, shall serve as an affirmation that the Contractor agrees to and can meet the applicable requirements of the updated Construction Progress Schedule.

6.5.14.3 The Contractor's failure to timely submit an approved, updated Construction Progress Schedule may result in withholding payment in accordance with **Section 9.8**.

6.6 Progress Meetings

6.6.1 The A/E shall schedule a weekly progress meeting for the Contractor and other Persons involved in the Project. The purpose of the progress meeting is to review progress on the Project during the previous week, discuss anticipated progress during the following weeks, review critical operations, and discuss critical problems.

6.6.2 The Contractor shall be represented at every progress meeting by a Person authorized with signature authority to make decisions regarding possible modification of the Contract Documents or Construction Progress Schedule.

6.6.2.1 The A/E shall notify the Contractor and other Persons involved in the Project of the time and place of the progress meeting that shall thereafter be the same day and hour of the week for the duration of the Project, unless the A/E notifies the Contractor and other Persons involved in the Project of a different day and hour at least two days in advance.

6.6.2.2 The Contractor shall have any of its Subcontractors attend the progress meeting as determined advisable by the Contractor, or as requested by the A/E.

6.6.3 The A/E shall prepare a written report of each progress meeting and distribute the report to the Contracting Authority, Owner, and Contractor. The A/E shall not delegate the duty to prepare a written report of any progress meeting.

6.6.3.1 If any Person in attendance objects to anything in a report of a progress meeting, the Person shall notify the A/E, Contracting Authority, and any other affected Person in writing explaining the objection within five days.

6.6.3.2 The report of each progress meeting shall reflect any objection made to the report of the previous progress meeting and any response.

6.7 Project Coordination

6.7.1 The Contractor shall prepare drawings ("Coordination Drawings") after the Contractor and appropriate Subcontractors ("Coordination Participants") **(1)** determine the sequence of the Project, **(2)** identify the areas requiring special attention ("Coordination Areas"), and **(3)** determine the need for a coordination drawing for any Coordination Area. The Contractor shall prepare the Coordination Drawings with Computer-Aided Design ("CAD") or Building Information Modeling ("BIM") software acceptable to the Contracting Authority. The Coordination Drawings shall show the sheet metal work with plan and elevation dimensions, which specifically locate all HVAC ductwork, HVAC equipment, and HVAC piping for each Coordination Area based upon the information, discussion, and resulting consensus of the Coordination Participants during the coordination meetings.

6.7.1.1 After the Contractor completes the Coordination Drawings, the Contractor shall forward a copy of the Coordination Drawings to the A/E, Contracting Authority, and Owner.

6.7.1.2 The A/E shall review the Coordination Drawings to determine whether the Coordination Participants achieved the goals listed in **Section 6.7.1**. The A/E shall report any concerns, in writing, to the Coordination Participants within 14 days after receiving the drawings.

6.8 Review of Contract Documents and Field Conditions

6.8.1 Before starting each portion of the Work, the Contractor shall carefully study and compare the various Contract Documents relative to that portion of the Work, 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.

6.8.2 If the Contractor finds any perceived ambiguity, conflict, error, omission, or discrepancy on or between any of the Contract Documents, or between any of the Contract Documents and any Applicable Law, the Contractor, before proceeding with the Work, shall promptly submit a Request for Information ("RFI") to the A/E for an interpretation or clarification.

6.8.2.1 Before submitting any RFI to the A/E, the Contractor shall carefully review the Contract Documents to ensure that the Contract Documents do not answer the RFI.

6.8.2.2 The A/E shall respond to an RFI within three days of receiving the RFI.

6.8.2.3 Any interpretation or clarification of the Contract Documents made by any Person other than the A/E, or in any manner other than writing, shall not be binding and the Contractor shall not rely upon it.

6.8.3 If the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of clarifications or instructions issued by the A/E in response to a RFI, the Contractor may request a Change Order by giving written notice under **Section 7.3.2** within seven days of receiving the A/E's RFI response.

6.8.4 If the Contractor does not notify the A/E per **Section 6.8.3**, the Contractor will have accepted the RFI response without an adjustment to the Contract Sum or Contract Times.

6.9 Protection of the Project

6.9.1 The Contractor shall protect the Work from weather and maintain the Work and all materials, apparatus, and fixtures free from injury or damage until Substantial Completion of the Work.

6.9.1.1 The Contractor shall at all times cover or protect the Work.

6.9.1.2 The Contractor, at its expense, shall remove, and replace with new, any Work damaged as a result of the Contractor's failure to provide coverage or protection.

6.9.1.3 The Contractor, at its expense, shall repair or replace any adjacent property, including, but not limited to, roads, walks, shrubbery, plants, trees, or turf, damaged during performance of the Contract.

6.9.1.4 After the date of Substantial Completion of the Work, the Owner is responsible for protecting and maintaining all materials, apparatus, and fixtures for the occupied portion of the Project free from injury or damage.

6.9.2 The Contractor shall protect the Project and existing or adjacent property from damage at all times and shall erect and maintain necessary barriers, furnish and keep lighted necessary danger signals at night, and take reasonable precautions to prevent injury or damage to individuals or property.

6.9.3 The Contractor shall not load, or permit any part of the Project to be loaded, in any manner that endangers the Project, or any portion thereof. The Contractor shall not subject any part of the Project or existing or adjacent property to stress or pressure that endangers the Project or property.

6.9.4 The Contractor shall provide all temporary bracing, shoring, and other structural support required for safety and proper execution of the Work.

6.9.5 Vibration, Noise, and Dust Control.

6.9.5.1 The Contractor shall provide controls/barriers for vibrations, noise, and dust control in occupied buildings as required by the construction operations.

6.9.5.2 The Contractor will not be permitted to exhaust or release unfiltered air, dust, construction debris, or other undesirable products into the exterior atmosphere or into occupied areas of the building outside the Site. The Project Manager may limit or stop the Work if the Contractor does not maintain proper air-quality standards.

6.9.5.3 In certain occupied buildings, tasks might be of such a nature that noise and vibration cannot be tolerated. In such spaces, Work shall be scheduled for other than normal working hours. The Contractor is cautioned that weekend or overtime work, if required, shall be performed at no additional cost. The Contractor shall obtain the Contracting Authority's written permission before working other than standard hours. Weekend and overtime Work shall be reflected in the Construction Progress Schedule.

6.9.5.4 The Contractor is responsible for vibration control and control of transmission of noise arising from the Work. Principal considerations that shall be given to noise and vibration control are:

.1 Noise control in compliance with Occupational Safety and Health Administration ("OSHA") requirements for the health and safety of building occupants; control shall be for all areas of the facility, including equipment rooms, boiler rooms, and fan rooms.

.2 Vibration control to limit sound produced by construction equipment, and for protection of the equipment existing in a building and the building structure.

.3 Vibration control to provide for maximum usefulness of the facility by keeping levels of vibration within ranges conducive to study and work or other uses for which the facility is designed.

6.10 Materials and Equipment

6.10.1 The Contractor shall provide new materials and equipment of the quality specified in the Contract Documents.

6.10.2 The Contractor shall bring to or store at the Site only the materials and equipment required in the Work. If possible, materials and equipment should be installed in their final positions when brought to the Site.

6.10.2.1 The Contractor shall properly store and protect all materials and equipment it provides to the Project.

6.10.2.2 The Contractor shall timely remove from the Site any materials or equipment no longer required for the Work.

6.10.3 The Contractor shall not allow materials or equipment to damage the Project or adjacent property, or to endanger any individual at or near the Site.

6.10.4 If the Contractor provides an Acceptable Component, the Contractor shall be solely responsible for the costs of coordination and modification required.

6.10.5 If the Contractor provides approved Substitutions that require changes to the Contract Documents, the Contractor shall be solely responsible for the additional costs incurred as a result, including, but not limited to, changes to the design by the A/E.

6.10.6 The A/E shall consider Requests for Substitutions after the bid opening only when the Contractor can conclusively demonstrate to the A/E the following conditions:

6.10.6.1 the specified Basis of Design Components, Acceptable Components, or previously-approved Substitutions, through no fault of the Contractor or a Subcontractor, are not available; or

6.10.6.2 the specified Basis of Design Components, Acceptable Components, or previously-approved Substitutions will not perform as designed or intended.

6.10.7 The Contractor's incorporation of unapproved Substitutions in the Work is Defective Work.

6.11 Labor

6.11.1 The Contractor shall maintain a sufficient workforce and enforce good discipline and order among its employees and the employees of its Subcontractors. The Contractor shall not permit employment of individuals not skilled in tasks assigned to them.

6.11.2 The Contractor shall dismiss from the Project any individual employed by the Contractor, or a Subcontractor, who the Contracting Authority finds, in its sole discretion, to be incompetent, guilty of misconduct, or detrimental to the Project.

6.11.3 The Contractor shall employ all legal efforts to minimize the likelihood or effect of any strike, Work stoppage, or other labor disturbance. Informational pickets shall not justify any Work stoppage.

6.12 Safety Precautions

6.12.1 The Contractor shall take reasonable precautions to ensure the safety of individuals on the Project.

6.12.1.1 The Contractor is responsible for designing and implementing its own safety program, including compliance with OSHA regulations. The Contractor's safety plans, such as fall protection, hazards, communications, competent person, etc., shall meet or exceed the Owner's safety plan (if any).

6.12.2 The Contractor shall pay any fine or cost incurred because of the Contractor's violation, or alleged violation, of Applicable Law.

6.12.3 Before starting any Work, the Contractor shall submit to the Contracting Authority a copy of the Contractor's site-specific safety plan and safety manuals.

6.12.4 The Contractor shall not introduce Hazardous Materials to the Project (other than as specified in the Contract Documents or customary construction materials or equipment) or burn any fires on the Site.

6.12.4.1 If the Contractor brings Hazardous Materials to the Project, the Contractor must take reasonable precautions to prevent the Hazardous Materials from causing bodily injury or death, property damage, or environmental damage.

6.12.4.2 The Contractor shall notify the Project Manager 24 hours before the start of non-routine or non-recurring hot-work. Use of sources of fire, flame or sparks and flammable materials shall be kept to an absolute minimum. At the beginning of the Project, the Contractor shall inform the Project Manager of its intent to use blowtorches, welding apparatus or similar exposed flame and sparking devices. The Contractor shall give similar notice in regard to the use of flammable liquids, adhesives, and cleaners.

6.12.4.3 The Contractor shall furnish an appropriate number of fire extinguishers (minimum of one), which shall be within the immediate areas where work is being done at all times. The extinguisher(s) shall be adequate and suitable for the class of fire likely to be caused by the Contractor's operations.

6.12.5 Work Stoppage Due to Hazardous Materials.

6.12.5.1 If the Contractor encounters material the Contractor reasonably believes to be or contain, a Hazardous Material that has not been rendered harmless, the Contractor shall immediately stop Work in the affected area and verbally report the condition to the Contracting Authority and A/E, and within one business day deliver written notice of the condition to the Contracting Authority and A/E.

6.12.5.2 The Contracting Authority will promptly determine the necessity of the Owner retaining a qualified environmental consultant to evaluate the suspected Hazardous Material and to issue a related written report. Where appropriate, the Owner will engage a licensed abatement contractor to remove the material or render it harmless as directed.

6.12.5.3 The Contractor shall resume Work in the affected area upon written notice from the A/E that **(1)** the suspect material was evaluated and found not to be or contain a Hazardous Material, or **(2)** the suspect material has been removed or rendered harmless.

6.12.5.4 If the Contractor knowingly or negligently proceeds with the Work in an area where a Hazardous Material exists and has not been rendered harmless, the Contractor shall be solely responsible for all related claims, damages, losses, and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performing the Work in the affected area.

6.12.5.5 The term "rendered harmless" means that the level of exposure is less than any applicable exposure standards set forth in Applicable Law.

6.12.6 Safety Data Sheets.

6.12.6.1 The Contractor shall identify any material it uses at the Site with a Safety Data Sheet ("SDS") meeting the requirements of OSHA's Hazard Communication Standard.

6.12.6.2 The Contractor shall maintain a notebook containing all of its applicable SDSs. That notebook shall be kept at the Site for the duration of the Project.

6.13 Construction Facilities, Utilities, and Equipment

6.13.1 Facilities.

6.13.1.1 The Contractor shall provide and maintain clean and suitable temporary facilities, equipment, services, and enclosed storage for its use at the Site.

6.13.1.2 The Contractor shall provide and maintain in a clean condition:

- **.1** suitable facilities, equipment, and services for use by the A/E and Contracting Authority;
- **.2** adequate space, equipment, and furnishings to conduct progress meetings, and store approved documents and permits; and
- **.3** adequate sanitary facilities for use by all Persons at the Site.

6.13.2 Environmental Controls.

6.13.2.1 The Contractor shall protect its Work and materials from weather and damage from heat, cold, and humidity.

6.13.2.2 Until the permanent HVAC system is complete and available for use:

.1 the Contractor shall make arrangements and pay for installation and maintenance of temporary heating and ventilating systems; and

.2 the Contractor shall pay the costs incurred in operating the temporary heating and ventilating systems.

6.13.2.3 When the permanent HVAC system is complete and available for use:

.1 The Contractor shall start up and maintain operation of the permanent HVAC system, including filters, and promptly remove temporary heating and ventilating systems.

.2 If the Project consists entirely of new construction, the Contractor shall pay the costs of energy consumed in operating the permanent HVAC system until Substantial Completion.

.3 If the Project is a renovation of an existing building or structure, addition(s) to an existing building or structure, or any combination of new construction and renovation work that does not allow separate metering of utilities, the Owner shall pay the costs of energy consumed in operating the permanent HVAC system.

6.13.2.4 From the date of Substantial Completion, the Owner shall pay the cost of operating the permanent HVAC system for the occupied portion of the Project.

6.13.2.5 If the permanent HVAC system is used during construction, the Contractor shall furnish an extended warranty and service contract in effect until the expiration of the Correction Period.

6.13.3 Water and Drainage.

6.13.3.1 The Contractor shall provide water necessary for the Work until the permanent plumbing system is available for use.

6.13.3.2 The Contractor shall provide temporary drainage and dewatering necessary for the Work and shall employ pumps, trenches, drains, sumps, and other necessary elements required to provide satisfactory working conditions for the protection, execution, and completion of the Project.

6.13.3.3 The Contractor shall make arrangements and pay for installation and maintenance of temporary plumbing systems until the permanent plumbing system is available for use.

6.13.3.4 When the permanent plumbing system is complete and available for use:

.1 The Contractor shall start up and maintain operation of the permanent plumbing systems, and make arrangements and pay for removal of temporary plumbing systems.

.2 If the Project consists entirely of new construction, the Contractor shall pay the costs of water consumed and sewerage charges until Substantial Completion.

.3 If the Project is a renovation of an existing building or structure, addition(s) to an existing building or structure, or any combination of new construction and renovation work that does not allow separate metering of utilities, the Owner shall pay the costs of water consumed and sewerage charges.

6.13.3.5 From the date of Substantial Completion, the Owner shall pay the costs of water consumed and sewerage charges for the occupied portion of the Project.

6.13.3.6 If the permanent plumbing system is used during construction, the Contractor shall furnish an extended warranty and service contract in effect until the expiration of the Correction Period.

6.13.4 Electric Service.

6.13.4.1 The Contractor shall provide temporary light and power; and pay the charges for temporary electric service installation, and removal if required.

6.13.4.2 If the Project consists entirely of new construction, the Contractor shall pay the cost of energy consumed until Substantial Completion.

6.13.4.3 If the Project is a renovation of an existing building or structure, addition(s) to an existing building or structure, or any combination of new construction and renovation work that does not allow separate metering of utilities, the Owner shall pay the cost of energy consumed.

6.13.4.4 From the date of Substantial Completion, the Owner shall pay the cost of energy consumed for the occupied portions of the Project.

6.13.4.5 If the permanent electrical system is used during construction, the Contractor shall furnish an extended warranty and service contract in effect until the expiration of the Correction Period.

6.13.5 Hoisting Facilities.

6.13.5.1 The Contractor shall erect and maintain any hoisting equipment required for its Work.

6.13.5.2 If the electric service requirements of hoisting facilities differ from that available at the Site, the Contractor shall provide and pay for all necessary connections.

6.13.5.3 If a permanent elevator is identified in the Contract Documents to be used for hoisting materials or personnel during construction, the Contractor shall furnish an extended warranty and service contract in effect until the expiration of the Correction Period.

6.14 Progress Cleaning

6.14.1 The Contractor shall remove all waste materials, rubbish, and mud attributable to the Work to an appropriate disposal location at, or near, the Site.

6.14.2 The Contractor shall perform weekly broom cleaning of hard flooring surfaces in the area of the Work.

6.14.3 The Contractor shall remove, once each working day or as appropriate for the Project, all waste materials and rubbish from the disposal location at, or near, the Site.

6.14.4 The Contractor shall remove, as appropriate for the Project or as the A/E or Owner directs, any waste materials or rubbish from areas adjacent to the Project.

6.14.4.1 The Contractor shall dispose of waste materials, rubbish, and construction debris in a lawful manner in approved recycling facilities or landfills.

6.14.5 If the Contractor fails to clean up during the progress of the Work, the Contracting Authority may clean up on behalf of the Contractor and at the Contractor's expense. If the Contractor fails to maintain the areas adjacent to the Project clean and free of waste materials and rubbish, the Contracting Authority may also direct the local jurisdiction responsible for the area to have the area cleaned to its satisfaction at the Contractor's expense.

6.14.5.1 The Contracting Authority may deduct the cleaning costs from payments then or thereafter due the Contractor. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

6.14.6 The Contractor shall remove excavated material and spoil to a suitable off-site location approved by the Contracting Authority.

6.14.6.1 If the Owner designates a location on its property for disposal or storage of clean topsoil and/or subsoil in the Contract Documents, the Contractor shall remove such materials to the designated location.

6.15 Use of Premises

6.15.1 The Contractor shall use corridors, stairs, and elevators as designated by the Contracting Authority. The Contractor shall exercise extreme care to not exceed the carrying capacity of elevators or damage the cab interior in any way.

6.15.2 Loitering or wandering through the interior of buildings or exterior grounds outside the limits of the Work will not be permitted.

6.15.3 The Contractor shall confine its apparatus, materials, and the operations of its workers to the limits indicated by Applicable Law and the directions of the A/E or Project Manager.

6.15.4 No signs or advertising of any kind will be permitted on or about the Site, except those appearing on trucks and trailers.

6.15.5 Site Logistics Plan.

6.15.5.1 The Contractor shall prepare a plan of the Site indicating how the Contractor intends to use the Site. The plan should illustrate, as an example, areas to be used for lay down of material and equipment; office and storage trailer locations; vehicular access gates with ingress and egress routes; locations of wheel wash and concrete truck wash out activities; and offloading and hoisting locations.

6.15.6 Smoking and Tobacco Products.

6.15.6.1 All State buildings are smoke free. Smoking will not be permitted in any indoor area. The ban on tobacco products will be observed in all indoor and outdoor areas and parking areas on all State-owned and leased property. The Contractor shall enforce these restrictions on any individual employed by the Contractor, or a Subcontractor.

6.16 Interruption of Existing Services

6.16.1 Whenever it becomes necessary to interrupt existing services in use by the Owner or its tenants, including but not limited to sewer, water, gas, and steam lines, electric, telephone, and cable service, the Contractor shall continue the associated Work on a non-stop 24-hour per day basis until that Work is completed and the service restored, or at an alternate time required by the Contracting Authority.

6.16.2 Before beginning that Work, the Contractor shall apply in writing to, and receive approval in writing from, the Owner, through the A/E, to establish a time when interruption of the service will cause a minimum of interference with the activities of the Owner and its tenants.

6.17 Explosives and Blasting

6.17.1 The Contractor shall not conduct blasting on, or bring explosives to, the Site without the prior written approval of the Contracting Authority, Owner, and other authorities with jurisdiction.

6.17.2 The Contractor shall perform all blasting, storing, and handling of explosives as required under Applicable Law.

6.17.2.1 The Contractor shall carry appropriate liability insurance coverage, as required by the Contract Documents, for its blasting and explosives storage and handling operations. Immediately upon request, the Contractor shall deliver evidence of that insurance to the Contracting Authority.

6.18 Building Commissioning

6.18.1 If the Project scope includes building commissioning, the Contractor shall participate in the Commissioning Process, as prescribed in the Contract Documents.

6.18.2 The Contractor shall permit the A/E, or a third-party Commissioning Agent ("CxA") if applicable, access to commission performance based equipment, fixtures, and/or systems (e.g., HVAC, fire protection, smoke evacuation, fume hoods, emergency power, etc.), prior to Substantial Completion.

6.18.3 The A/E, or CxA if applicable, shall promptly notify the Contractor in writing of any deficiency identified during the Commissioning Process.

6.18.4 To facilitate the Commissioning Process, the Contractor shall submit four sets of Operation and Maintenance Manuals for dynamic and engineered systems to the A/E, and CxA if applicable, for approval. That submission shall occur within 30 days following approval of all related Contractor submittals required by the Contract Documents.

6.19 Action Submittals

6.19.1 Submittal Description. Shop Drawings, Product Data, Samples, and other submittals for the A/E's review and action shall be provided by the Contractor for any item required by the Contract Documents but not fully described in the Contract Documents, unless waived by the A/E, and include, but are not limited to:

6.19.1.1 construction of the various parts, method of joinery, type of materials, grade, quality and thickness of materials, alloy of materials, profiles of all sections, reinforcement, method of hanging doors or installing windows, anchorage, and type and grade of finish;

6.19.1.2 capacities, types of materials and performance charts that are pertinent to the materials, and performance charts that are pertinent to the equipment item; and

6.19.1.3 wiring diagrams, control diagrams, schematic diagrams, working and erection dimensions, arrangement and specifications.

6.19.2 Form of Submittals. The Contractor shall provide a transmittal letter, review and stamp its approval, and transmit the submittals to the A/E in accordance with the submittal schedule established by the A/E and Contractor.

6.19.2.1 The Contractor shall submit a minimum of one reproducible and three copies of Shop Drawings, and a minimum of four copies of any other submittal, except when using the State's web-based project management software.

6.19.2.2 The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to communicate to the A/E the materials and equipment that the Contractor proposes to provide.

6.19.2.3 Each Sample shall be identified clearly as to materials, supplier, pertinent data as catalog numbers, the intended use, and other uses as the A/E may require enabling the A/E to review the submittal.

6.19.3 Variation from Contract Documents. If the submittals show variations from the requirements of the Contract Documents, the Contractor shall specifically and clearly identify the variations in its letter of transmittal.

6.19.3.1 Variations that may affect the construction quality, cost or timeline shall be submitted by the A/E to the Contracting Authority for review, and if approved, shall be incorporated into the Work by Change Order.

6.19.3.2 The Contractor shall not be relieved of responsibility for deviations from the Contract Documents by the A/E's approval of submittals.

6.19.3.3 Submittals are not Contract Documents. In the event of conflicts between submittals and the Contract Documents, the Contract Documents take precedence and govern the Work.

6.19.4 Contractor's Submittal Review. The Contractor shall review and stamp "approved" all submittals before forwarding them to the A/E. If it is apparent to the A/E that the Contractor has not reviewed the submittals, or has conducted an incomplete review, the A/E may reject the submittals.

6.19.4.1 The Contractor shall field verify conditions as necessary and make corrections of dimensions, locations of various items, encroachments of work of Separate Contractors, or variations from the requirements of the Contract Documents.

6.19.4.2 If required by the Contract Documents or Applicable Law, the Contractor shall have Shop Drawings or other submittals prepared by Persons possessing expertise and experience in an appropriate trade or profession or by a registered architect, professional engineer, or other professional.

6.19.4.3 By approving and submitting submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related to the associated Work, or shall do so, and has checked and coordinated the information contained within the submittals with the requirements of the Work and of the Contract Documents.

6.19.5 A/E's Submittal Review. The A/E shall review submittals for conformity with design intent within 14 days after receiving them or in accordance with the approved submittal schedule, or other period as mutually agreed by the A/E and Contractor. The A/E's review of submittals is to determine if the items covered by the submittals will, after installation and incorporation into the Work, conform to the Contract Documents and be compatible with the design concept of the Project as a functioning whole.

6.19.5.1 The Contractor shall make corrections required by the A/E and resubmit the required number of corrected copies of submittals until approved, which resubmission shall be acted upon by the A/E within 14 days after receiving them, or other period mutually agreed by the A/E and Contractor.

6.19.5.2 When resubmitting corrected submittals, the Contractor shall direct the A/E's attention to revisions made by noting revisions on the resubmittal.

6.19.5.3 The Contractor shall pay all reasonable costs of the A/E, Owner, and Contracting Authority for attendant delay, interference, hindrance, or disruption of the Project due to excessive resubmittals without fault of the A/E, Owner, or Contracting Authority. Resubmittals in excess of two without fault of the A/E, Owner, or Contracting Authority may be determined excessive by the Contracting Authority.

6.19.5.4 The A/E may hold Samples and other submittals used to coordinate finishes, colors, patterns, textures, or other characteristics until submittals for adjacent materials are available. Within seven days after receiving the submittal, the A/E shall issue a written notice to the Contractor stating that the submittal is being held.

6.19.5.5 If coordinating submittals are not received within the period required for action on previously received submittals that are held in accordance with **Section 6.19.5.4**, review of the previously received submittals may be delayed.

6.19.5.6 The A/E's review shall not extend to means, methods, manners, techniques, sequences, or procedures of construction, or to safety precautions or incident programs.

6.19.5.7 The review and approval of a separate item shall not indicate approval of the assembly in which the item functions.

6.19.6 Risk of Nonpayment. The Contractor shall not commence any portion of the Work requiring Shop Drawings, Product Data, Samples, or other submittals until the submittal has been approved by the A/E. If the Contractor starts Work before the A/E's final approval of the submittal, the Contractor does so at its own risk that payment may not be approved by the Contracting Authority or made by the Owner for the related Work.

6.19.7 Equipment Statement. Shop Drawings on equipment shall include the following written statement from the manufacturer of the equipment:

6.19.7.1 "This equipment submitted for approval shall perform as specified when installed in the arrangement shown on this drawing and in the Contract Documents and in conjunction with all other accessories as flues, breechings, piping, controls, and equipment not furnished by this manufacturer, but required as an accessory or supplement to this equipment, providing that the accessory or supplementary items perform as specified and are installed as shown in the Contract Documents."

.1 The Contractor will be deemed to have included the above statement as required even if the associated Shop Drawing does not actually contain the statement.

6.19.7.2 This equipment statement shall not be required for Samples, Product Data, and other standard submittals that are not created specifically for this Project.

6.19.8 Domestic Steel Certifications. The Contractor shall include the following written certifications on the front cover or initial sheet of each structural steel fabrication Shop Drawing, signed and dated prior to fabrication:

6.19.8.1 "Steel Fabricator Certification: The steel fabricator identified below certifies that for this project all load-bearing structural steel has been fabricated or produced, to the best of its knowledge, only from steel made in the United States in accordance with Ohio Revised Code Section 153.011. Further, the steel fabricator hereby certifies that it has read and understands that a monetary penalty for violations may be imposed under the authority of Ohio Revised Code Section 153.99." This certification shall be followed by the name of the fabrication company, name of the company official signing the certification, the signature of that company official, and the date of that signature.

.1 The Contractor will be deemed to have included the above certification as required even if the associated Shop Drawing does not actually contain the certification.

6.19.8.2 "Contractor Certification: The contractor identified below certifies that it has required as a condition of purchase, that for this project all load-bearing structural steel shall be fabricated and produced using, to the best of its knowledge, only steel made in the United States in accordance with Ohio Revised Code Section 153.011. Further, the contractor hereby certifies that it has read and understands that a monetary penalty for violations may be imposed under the authority of Ohio Revised Code Section 153.99." This certification shall be followed by the name of the Contractor company, name of the company official signing the certification, the signature of that company official, and the date of that signature.

.1 The Contractor will be deemed to have included the above certification as required even if the associated Shop Drawing does not actually contain the certification.

6.20 Warranty

6.20.1 The Contractor warrants to the Contracting Authority and Owner that all materials and equipment furnished under the Contract shall be new and of good quality unless otherwise required or permitted by the Contract Documents, that the Work shall be free from defects not inherent in the quality required or permitted, and that the Work shall conform to the requirements of the Contract Documents. Work not conforming to those requirements, including Substitutions not properly approved and authorized is Defective Work. If required by the A/E, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

6.20.2 If the Contractor or a Subcontractor recommends a particular product, material, system, or item of equipment for incorporation into the Project and the Owner accepts that recommendation, the above warranty includes a warranty from the Contractor to the Owner that the recommended product, material, system, or item of equipment is fit and appropriate for the associated purpose.

6.21 Additional Tests and Inspections

6.21.1 If before or after Substantial Completion the A/E or the Contracting Authority determines that any portion of the Work requires special inspection, testing, or approval not otherwise required under the Contract Documents, the A/E shall order such inspection, testing, or approval.

6.21.1.1 If the special inspection, testing, or approval reveals Defective Work, the Contractor shall pay all associated costs and will not be entitled to any related adjustment of the Contract Times. Those costs may include, but are not limited to:

.1 the cost of the special inspection, testing, or approval;

.2 the cost of conducting the special inspection, testing, or approval on similar Work regardless of whether the similar Work is also revealed as Defective Work;

.3 the cost of additional special inspections, testing, or approvals to evaluate remedial Work;

.4 the cost of correcting the Defective Work; and

.5 all related Owner-incurred fees and charges of contractors, engineers, architects, attorneys, and other professionals.

6.21.1.2 The Contracting Authority may deduct the costs described under **Section 6.21.1.1** from payments then or thereafter due the Contractor. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

6.21.1.3 If the special inspection, testing, or approval reveals that the Work complies with the Contract Documents, and the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of the special inspection, testing, or approval, the Contractor may request a Change Order by giving written notice under **Section 7.3.2** within seven days after the special inspection, testing, or approval.

6.21.2 If the Contractor is aware of a need for inspection, testing, or approval, or of a need to have any inspection, testing, or approval completed by a particular time to avoid delay, then the Contractor shall timely communicate such information to the A/E and Contracting Authority.

6.21.3 Except as described under **Section 6.21.1**, the Owner shall pay for any inspection, testing, or approval that did not become a requirement until after it awarded the Contract.

6.21.4 The Contractor shall coordinate with and give the A/E, Contracting Authority, and Owner reasonable notice of the anticipated dates of all inspections, testing, or approvals.

6.21.5 Within five days after completion of an inspection, testing, or approval, the A/E shall provide an original report/certificate of the inspection, testing, or approval to the Contractor and Contracting Authority with a recommendation for or against acceptance of the results therein.

6.22 Uncovering the Work

6.22.1 If the Contractor covers Work contrary to the requirements of the Contract Documents or contrary to the written request of the Contracting Authority or A/E, the Contractor shall, if the Contracting Authority or A/E requests in writing, uncover that Work for observation, correct it if not in conformity with the Contract Documents, and recover it at the Contractor's expense without adjustment of the Contract Times.

6.22.2 If the Contractor covers Work in accordance with the Contract Documents and not contrary to a request from the A/E or Contracting Authority for an opportunity to observe the Work prior to covering, the Contractor shall, if the A/E requests in writing, uncover that Work.

6.22.2.1 If the uncovered Work is Defective Work, the Contractor shall pay the costs of uncovering, correcting, and recovering the Work and shall not be entitled to an adjustment of the Contract Times.

6.22.2.2 If the uncovered Work is not Defective Work and the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of the uncovering and recovering of the Work, the Contractor may request a Change Order by giving written notice under **Section 7.3.2** within seven days after the Contracting Authority or A/E observes the uncovered Work.

6.23 Correction of the Work

6.23.1 Before Substantial Completion.

6.23.1.1 If the Contractor provides Defective Work or fails or neglects to perform the Work in accordance with the Construction Progress Schedule, the Contracting Authority or A/E may issue a written notice to the Contractor and Contractor's Surety directing the Contractor to correct the Defective Work or recover schedule deficiencies. Unless otherwise specified in that written notice, the Contractor shall promptly commence and diligently pursue correction of the Defective Work and recovery of schedule deficiencies within no more than three days after the Contracting Authority issues the written notice ("72-Hour Notice").

6.23.1.2 If the Contractor fails to promptly commence and diligently pursue correction of the Defective Work and recovery of schedule deficiencies required under **Section 6.23.1.1**, the Owner may correct the Defective Work or take action to recover schedule deficiencies without giving further notice to the Contractor or Contractor's Surety.

6.23.2 After Substantial Completion.

6.23.2.1 In addition to the Contractor's other obligations under the Contract Documents, if any of the Work is found to be Defective Work after Substantial Completion, the Contractor shall correct it promptly after receipt of written notice from the A/E, Contracting Authority, or Owner to do so, unless the Contracting Authority and Owner have previously acknowledged and accepted the Defective Work in writing as described under **Section 6.24.1**. The A/E,

Contracting Authority, or Owner may send a copy of the written notice to the Contractor's Surety, but are not obligated to do so.

6.23.2.2 During the Correction Period. If the Contracting Authority or Owner issues a notice under **Section 6.23.2.1** during the Correction Period, the Owner may correct the Defective Work itself without giving further notice to the Contractor or Contractor's Surety if the Contractor fails to **(1)** notify the Owner in writing of the Contractor's intent to correct the Defective Work within seven days after the Contracting Authority or Owner issues the notice and **(2)** thereafter promptly commence and diligently pursue correction of Defective Work.

6.23.2.3 The Correction Period:

- **.1** commences on the date of Substantial Completion of the Work or a designated portion of the Work which the Contracting Authority and Owner have agreed to take Partial Occupancy;
- **.2** relates only to the Contractor's specific obligation and opportunity to correct the Work during the Correction Period;
- **.3** does not establish a period of limitation with respect to any of the Contractor's other obligations under the Contract Documents;
- **.4** has no relationship to the time within which the State or Owner may seek to enforce the Contract;
- **.5** does not establish a period of limitation within respect to the commencement of litigation to establish the Contractor's liability under the Contract or otherwise; and
- **.6** shall not be extended by corrective Work performed by the Contractor under this **Section 6.23.2**.

6.23.2.4 After the Correction Period. If the Owner issues notice under **Section 6.23.2.1** after expiration of the Correction Period, the Owner may correct the Defective Work without giving further notice to the Contractor or Contractor's Surety if the Contractor fails to **(1)** notify the Owner in writing of the Contractor's intent to correct the Defective Work within 14 days after the Owner issues the notice and **(2)** thereafter promptly commence and diligently pursue correction of Defective Work.

6.23.3 Emergency Correction of Defective Work.

6.23.3.1 Notwithstanding any other provision of the Contract to the contrary, if in the Contracting Authority's or Owner's opinion the Defective Work presents a threat of imminent harm or danger to people, property, or the environment, the Contracting Authority or Owner may order the Contractor to immediately correct Defective Work or the Owner may correct the Defective Work itself without any prior notice to the Contractor or Contractor's Surety.

6.23.4 Responsibility for Costs of Correction.

6.23.4.1 The Contractor shall pay all of the costs and damages associated with the correction of Defective Work and the recovery of schedule deficiencies under this **Section 6.23**. Those costs and damages may include, but are not limited to, the related fees and charges of contractors, engineers, architects, attorneys, and other professionals; and the cost of correcting or replacing adjacent work. The Contracting Authority may deduct those costs and damages from payments then or thereafter due the Contractor. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

6.24 Acceptance of Defective Work

6.24.1 Before final Contract Completion, the Owner may accept any Defective Work instead of requiring its removal or correction, in which case the Contract Sum must be equitably reduced as described under **Article 7**.

6.24.1.1 The Owner may only accept Defective Work though a deduct Change Order that makes explicit reference to this **Section 6.24**.

6.24.1.2 After final Contract Completion, the Owner may only accept Defective Work by giving written notice to the Contractor that the Owner is accepting the associated Defective Work.

6.24.2 None of the following will constitute **(1)** acceptance of Defective Work, **(2)** a release of the Contractor's obligation to perform the Work in accordance with the Contract, or **(3)** a waiver of any rights set forth in the Contract or otherwise provided by Applicable Law:

6.24.2.1 observations or inspections by the Owner, Contracting Authority, or A/E;

6.24.2.2 the making of any payment;

6.24.2.3 Substantial Completion or the issuance of a Certificate of Substantial Completion;

6.24.2.4 Partial Occupancy and the Owner's use or occupancy of the Work or any part of it;

6.24.2.5 Contract Completion or the issuance of a partial or final Certificate of Contract Completion;

6.24.2.6 any review or approval of a submittal;

6.24.2.7 any inspection, test, or approval by other Persons; or

6.24.2.8 any correction of Defective Work by the Owner.

6.25 Project Document Maintenance and Submittal

6.25.1 During Construction.

6.25.1.1 The Contractor shall maintain in good order at a secure location on the Site:

.1 a complete copy of all Contract Documents; Shop Drawings, Product Data, Samples and similar required submittals; manufacturer operating and maintenance instructions; certificates; warranties; RFIs and responses thereto; and other Project-related documents, all marked currently and accurately to record field changes and selections made during construction and to show actual installation where installation varies from Work as originally shown, including the exact location and depth of underground utility lines; and

.2 a set of Drawings and Specifications, approved in accordance with **Section 5.2.1.1**, and the records required by **Section 6.2.17**.

6.25.1.2 Before submitting each Contractor Payment Request, the Contractor shall record all changes on the Contract Documents, neatly in a contrasting color, noting new information not shown on the original Contract Documents. Failure to record all changes may cause payment to be withheld or delayed by the Contracting Authority.

6.25.1.3 The Contractor shall keep a record of changes made to the Specifications, noting particularly any approved variation from manufacturers' installation instructions and recommendations.

6.25.1.4 If the Contractor uses Shop Drawings to indicate as-built conditions, the Contractor shall cross-reference the Shop Drawing sheet numbers to the corresponding sheet numbers on the Contract Documents. The Contractor shall note related numbers where applicable.

6.25.1.5 The Contractor shall at all times permit access to the documents described in this **Section 6.25.1** to authorized representatives of the State, local authorities having jurisdiction, Contracting Authority, Owner, and A/E.

6.25.2 Before Contract Completion.

6.25.2.1 The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall organize the As-Built Documents into manageable sets, bind the sets with durable paper cover sheets, and deliver the As-Built Documents to the A/E.

6.25.2.2 The Contractor's As-Built Documents submission shall include, but is not limited to:

.1 Certificate of Occupancy;

.2 inspection certificates for pressure piping, elevator, boiler, electrical, plumbing or piping purification, etc.;

.3 Letter of Approval from the local fire authority or State Fire Marshal for the fire suppression system;

.4 Operation and Maintenance Manuals, organized into suitable sets of manageable size. Indexed data bound in individual binders, with pocket folders for folded sheet information and appropriate identification marked on the front and the spine of each binder;

.5 neatly and accurately marked sets of As-Built Documents, and other Contract Documents reflecting the actual construction of the Project;

.6 detailed Drawings reflecting the exact location of any concealed utilities, mechanical or electrical systems, and components;

.7 assignment to the Owner of all warranties and guarantees, including the most-recent address and telephone number of any Subcontractors or manufacturers;

.8 an affidavit to certify that all Subcontractors have been paid in full for all Work performed or materials furnished for the Project;

.9 final certified payroll reports; and

.10 an affidavit to certify that the Contractor and each of its Subcontractors, regardless of tier, have complied with all requirements of ORC Chapter 4115.

6.25.2.3 By submitting the As-Built Documents to the A/E, the Contractor certifies that its As-Built Documents are complete, correct, and accurate.

6.25.3 Record Documents.

6.25.3.1 The A/E shall revise the original Contract Documents and related electronic files with the information contained on the As-Built Documents. The A/E shall label the revised original Contract Documents and related electronic files as "Record Documents" and reflect the date of the A/E's incorporation of the As-Built Documents.

6.25.3.2 The Owner may thereafter use the Record Documents for any purpose relating to the Project including, but not limited to, additions to or completion of the Project.

6.26 Final Cleaning

6.26.1 Before requesting the Substantial Completion inspection of the Work, the Contractor shall clean the Site, remove waste materials and rubbish attributable to the Project, and restore the property to its original condition so that upon Substantial Completion, the premises are ready for occupancy by the Owner.

6.26.2 If the Contractor performs any Work after final cleaning, the Contractor shall clean the affected area as provided above so that upon Substantial Completion, the premises are ready for occupancy by the Owner.

6.26.3 Final cleaning shall be done to the reasonable satisfaction of the A/E and Contracting Authority.

6.27 Substantial Completion

6.27.1 Contractor's Punch List.

6.27.1.1 When the Contractor considers the Work, or a designated portion thereof, Substantially Complete the Contractor shall inspect the Work and prepare a list of Defective Work and incomplete or unacceptable Work ("Contractor's Punch List"). The Contractor shall list all items of Work not in compliance with the Contract Documents, including items the Contractor is requesting to be deferred.

- **.1** The Contractor shall proceed to correct all items listed on the Contractor's Punch List and certify that the incomplete items listed on the Contractor's Punch List are to its knowledge an accurate and complete list by signing the Contractor's Punch List.
- **.2** The Contractor's failure to include an item on the Contractor's Punch List shall not alter the Contractor's responsibility to complete the Work in accordance with the Contract Documents.
- **.3** The Contractor shall submit the signed Contractor's Punch List to the A/E, together with a request for the Substantial Completion inspection of the Work.

6.27.1.2 If the Project is administered using the State's web-based project management software, the Contractor shall submit the Contractor's Punch List, using the "Punch List" business process.

6.27.2 Substantial Completion Inspection.

6.27.2.1 Within three business days after receipt of the request for the Substantial Completion inspection of the Work, the A/E shall notify the Contractor of acceptance or rejection of the request, stating reasons for any rejection.

- **.1** Within seven days after its acceptance of the Contractor's request, the A/E shall conduct the Substantial Completion inspection to determine whether the Work, or designated portion, is in conformity with the Contract Documents and Substantially Complete. The A/E shall notify the Contractor, Contracting Authority, and Owner of the scheduled time of the inspection.
- **.2** If the A/E determines that the Work is Substantially Complete, within three business days after the Substantial Completion inspection, the A/E shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion and include a list of Defective, incomplete, or unacceptable Work ("A/E's Punch List"). The A/E's Punch List shall include **(1)** the items on the Contractor's Punch List that are not yet completed or corrected as of the date of the Substantial Completion inspection, and **(2)** comments from the Contracting Authority and Owner.
- **.3** The A/E shall submit the Certificate of Substantial Completion to the Contracting Authority, Owner, and Contractor for their written acceptance. Upon their acceptance and consent of the Contractor's Surety, and subject to the Owner's right to withhold payment, the Owner shall release retainage as described under **Section 9.7.2**.
- **.4** The A/E's failure to include an item on the A/E's Punch List shall not alter the Contractor's responsibility to complete the Work in accordance with the Contract Documents.
- **.5** If the A/E accepts the request and subsequently determines that the Work is not Substantially Complete, the A/E may request compensation for expenses related to excessive Punch List activities. The Contracting Authority may deduct that additional compensation to the A/E from payments then or thereafter due the

Contractor. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

6.27.3 Completion of Punch List Items.

6.27.3.1 Before expiration of the Punch List Milestone and before the date of Final Contract Completion, the Contractor shall complete all items on the A/E's Punch List. After completing all items on the A/E's Punch List, the Contractor shall provide a written request for Final Inspection of the Work to the A/E.

.1 If Work on the A/E's Punch List cannot be timely completed, the Contractor shall justify in writing to the reasonable satisfaction of the Contracting Authority and A/E, the reasons the items cannot be completed, and the Contractor may propose, for the Contracting Authority and A/E's approval, an adjustment of the Punch List Milestone for the associated Punch List items to establish a time when the Contractor shall complete those items.

.2 Within three business days after receipt of the request for the Final Inspection of the Work, the A/E shall complete a Final Inspection of the Work for compliance with the Contract Documents.

.3 If multiple inspections of items on the A/E's Punch List are required due to the Contractor's failure to properly and timely complete them, the Contractor shall pay any additional costs incurred by the A/E, Owner, and Contracting Authority resulting from any attendant delay. The Contracting Authority may deduct those additional costs from payments then or thereafter due the Contractor. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

6.28 Partial Occupancy

6.28.1 The Owner may occupy or use a portion of the Project prior to Substantial Completion of all Work if:

6.28.1.1 the building authority with jurisdiction over the Project issues a partial certificate of occupancy for the portion of the Project the Owner intends to occupy;

6.28.1.2 the Owner with the Contractor's and A/E's assistance has provided written notice of the Partial Occupancy to the insurers providing builder's risk property insurance for the Project; and

6.28.1.3 the Contracting Authority has received notice of the Partial Occupancy from the A/E and has consented to it.

6.28.2 Before the Owner commences Partial Occupancy, the Owner, Contracting Authority, A/E, and Contractor shall proceed as described under **Section 6.27** for the area designated for Partial Occupancy.

6.28.3 The Contractor shall be relieved of the obligation to maintain the area accepted for Partial Occupancy, but shall remain obligated to complete and correct the Work and to carry the insurance required by the Contract Documents during performance of any such Work.

6.29 Demonstration and Training, Operating Appurtenances

6.29.1 The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall perform demonstration and training of the Owner's maintenance personnel as specified in the Contract Documents.

6.29.2 The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall organize and submit operating appurtenances and loose items related to operation and maintenance of the completed Project to the Owner, including, but not limited to:

6.29.2.1 keys to door and window hardware, panels, and other devices not directly provided to the Owner from the manufacturer;

6.29.2.2 operating handles, levers, cranks, specialized wrenches or drivers, remote controls, and similar items; and

6.29.2.3 extra materials (e.g., attic stock).

6.30 Contract Completion

6.30.1 Partial Contract Completion.

6.30.1.1 When items of Work cannot be completed until a subsequent date, the A/E shall prepare a partial Certificate of Contract Completion that shall include a detailed list of the deferred Work and the date(s) by which the Contractor will complete that Work.

6.30.1.2 The A/E shall submit the partial Certificate of Contract Completion to the Contracting Authority, Owner, and Contractor for their written acceptance. Upon their acceptance of the partial Certificate of Contract Completion and consent of the Contractor's Surety, the Contracting Authority may release payment to the Contractor, as determined in the sole discretion of the Contracting Authority.

6.30.2 Final Contract Completion.

6.30.2.1 When all items on the A/E's Punch List have been completed to the satisfaction of the A/E, all requirements of the Contract Documents have been completed, and the provisions of **Sections 6.25** through **6.29** have been fulfilled, the A/E shall prepare and recommend execution of a final Certificate of Contract Completion.

6.30.2.2 The date that the Contracting Authority executes the final Certificate of Contract Completion is the date of Contract Completion.

ARTICLE 7 - MODIFICATIONS

7.1 General

7.1.1 Changes in the Work.

7.1.1.1 The Contracting Authority may order changes in the Work without invalidating the Contract. Subject to the limitations stated in this **Article 7** and elsewhere in the Contract Documents, a change in the Work may be accomplished by a Change Order, Change Directive, or order for a minor change in the Work.

- **.1** The Contractor shall proportionately increase the amount of the Bond whenever the Contract Sum is increased.
- **.2** If notice of any change affecting the Contract is required by the provision of any Bond, notice is the Contractor's responsibility, and the amount of each applicable Bond shall be adjusted accordingly.

7.1.1.2 The Contractor shall not proceed with any change in the Work without the Contracting Authority's prior written authorization except as provided under **Sections 1.10** and **7.5**.

7.1.1.3 Except as provided in **Section 1.10**, the Contractor's failure to obtain prior written authorization for a change in the Work constitutes a waiver by the Contractor of an adjustment to the Contract Sum or Contract Times, or both, for the related Work.

7.1.1.4 The Contractor shall perform all changes in the Work under the applicable provisions of the Contract Documents, and the Contractor shall proceed promptly with the change unless otherwise provided in the Change Order, Change Directive, or order for a minor change in the Work

7.1.2 Paperwork Consolidation.

7.1.2.1 Related Modifications, with the same or similar justification (e.g., Owner Request or field resolution), may be consolidated into the same Change Order.

7.1.2.2 Add and deduct Modifications, with the same or similar justification, may be included on the same Change Order.

7.1.2.3 Modifications resulting from errors or omissions shall not be combined with other modifications for which the A/E will receive a fee.

7.1.3 Modification Numbering.

7.1.3.1 The A/E shall assign a number to each Modification, which shall uniquely identify it.

7.1.3.2 The A/E shall not duplicate or reuse any number throughout the Project or reuse assigned numbers for Proposal Requests that are initiated but cancelled in process.

7.1.3.3 The number for each Change Order shall be coordinated with any associated Proposal Request or Change Directive.

7.1.4 Modification Log.

7.1.4.1 The A/E shall create and maintain a Modification Log for the Project, which shall contain the following minimum information:

- **.1** number of the Modification;
- **.2** a brief description of the Modification;
- **.3** cost of the Modification;
- **.4** schedule impact of the Modification; and

.5 dates sent to, and received from, the parties.

7.1.5 Reconciliation of Unit Price Items.

7.1.5.1 The Contracting Authority may increase, decrease, or delete entirely the scheduled quantities of Unit Price Work.

7.1.5.2 The A/E shall issue a Change Order to reconcile the difference between the scheduled and actual quantities of Unit Price Work performed and materials furnished.

7.1.5.3 If the actual quantity of a Unit Price item differs from the scheduled quantity by 20 percent or more, so that application of the Unit Price to the quantities of Work proposed would create an undue hardship on either the Owner or Contractor, the A/E shall issue a Proposal Request and subsequent Change Order to adjust the Unit Price.

.1 If a Unit Price is adjusted as described under **Section 7.1.5.3**, the new Unit Price will only apply to the units of Work performed that are **(1)** less than the 20 percent threshold if the Unit Price is changed on account of an over-estimation of the scheduled quantity of a Unit Price item involved in the Work or **(2)** in excess of the 20 percent threshold if the Unit Price is changed on account of an under-estimation of the scheduled quantity of a Unit Price item involved in the Work.

7.1.5.4 If the actual quantity of a Unit Price item exceeds the scheduled quantity by 20 percent or more, the Contractor shall immediately notify the A/E, who shall issue a Change Directive and subsequent Change Order to authorize an adjustment in the scheduled quantity.

7.1.6 Notice of Credits and Schedule Reductions.

7.1.6.1 Notwithstanding any other provision of the Contract to the contrary, the Contractor shall promptly notify the Contracting Authority, Owner, and A/E in writing whenever any change in the Project (including without limitation through an order for a minor change in the Work) may entitle the Owner to a credit from the Contractor or a reduction of the time for completion of the Project.

7.2 Change Order Procedure

7.2.1 A Change Order is a written instrument prepared by the A/E and executed by the Contracting Authority and Contractor, stating their agreement upon all of the following:

7.2.1.1 a change in the Work;

7.2.1.2 the amount of the adjustment of the Contract Sum, if any; and

7.2.1.3 the extent of the adjustment of the Contract Times, if any.

7.2.2 Except with the Contracting Authority's written consent as explicitly provided under **Section 7.4.8**, the Contractor is not entitled to reserve any rights or take other similar action with respect to a Change Order if the effect or intent of the reservation or action would be to accommodate a further adjustment of the Contract Sum or Contract Times, or both, after the Contractor signs the Change Order. By signing a Change Order, the Contractor irrevocably certifies that the elements of a Change Order described in **Section 7.2.1** are completely and fully satisfied, and waives all rights, if any, to seek further adjustment of the Contract Sum or Contract Times, or both, at a later date with respect to the associated change in the Work including without limitation on account of **(1)** the "cumulative impact" of the associated change in the Work in combination with one or more other changes in the Work; **(2)** all direct and indirect costs, including interest on those costs; and **(3)** any delays, inefficiencies, disruptions, suspensions, extended overhead, and acceleration.

7.2.3 The A/E shall prepare each Change Order form, attach the supporting documentation, and issue the Change Order to the Contractor for signature.

7.2.4 If the Contractor is in agreement with the Change Order under **Section 7.2.1**, the Contractor shall sign and return the Change Order to the A/E within three days after receiving it.

7.2.5 When the A/E receives the Change Order signed by the Contractor, the A/E will recommend approval by signing the form and transmitting the Change Order and the revised Change Order Log to the Owner.

7.2.6 When the Owner receives the Change Order, the Owner may sign the form accepting the Change Order, attach certification of funding, and transmit the Change Order to the Contracting Authority; or, if the Owner does not accept the Change Order, the Owner will reject and return it to the A/E.

7.2.7 When the Contracting Authority receives the Change Order, the Contracting Authority may sign the form approving the Change Order, and transmit the fully executed Change Order to all signers; or, if the Contracting Authority does not accept the Change Order, the Contracting Authority will reject and return it to the A/E.

7.2.8 When the Change Order is signed by the Contractor, A/E, Owner, and Contracting Authority, the fully executed Change Order modifies the Contract Documents and authorizes and directs the Contractor to proceed, and the Contractor shall promptly proceed with the associated change in the Work.

7.3 Initiation of Change Orders

7.3.1 Proposal Request.

7.3.1.1 The A/E shall prepare and issue a Proposal Request to the Contractor to obtain the Contractor's Proposal for the adjustment of the Contract Sum or the Contract Times, or both, associated with a contemplated Modification.

.1 In any Proposal for an adjustment of the Contract Sum, the Contractor shall specifically identify the items set forth in **Section 7.7**.

.2 In any Proposal for an adjustment of the Contract Times, the Contractor shall specifically identify the items set forth in **Section 7.8**.

.3 The Contractor's cost of preparing and providing Proposals is included in the Contract Sum.

7.3.1.2 The Contractor shall respond with a Proposal to the A/E and Contracting Authority within 14 days after receiving the Proposal Request. The allowable time for the Contractor's response may be extended by written agreement of the Contractor and A/E.

7.3.1.3 The Contractor shall hold the Proposal valid and open for acceptance for at least 45 days. The acceptance period may be adjusted by mutual consent of the Contractor and Contracting Authority. The time limits described under this **Section 7.3.1.3** apply only to Proposals submitted in response to a Proposal Request.

7.3.1.4 A Proposal may be accepted by the Contracting Authority only through a Change Order. A Proposal Request does not authorize the Contractor to proceed with a change in the Work.

7.3.1.5 If the Contractor does not timely submit a Proposal within the time required in **Section 7.3.1.2**, the Contractor waives its right to an adjustment to the Contract Sum or Contract Times, or both, associated with the contemplated change in the Work.

7.3.2 Request for Change Order.

7.3.2.1 The Contractor may initiate a change in the Work by submitting written notice to the A/E accompanied by a Proposal meeting the requirements of **Section 7.3.1**.

7.4 Change Directives

7.4.1 A Change Directive is a written order prepared by the A/E and executed by the Contracting Authority directing a change in the Work and may, if necessary:

7.4.1.1 state a proposed basis for adjustment, if any, in the Contract Sum or Contract Times, or both; or

7.4.1.2 limit the scope of the change in the Work on a time and materials basis, not to exceed a fixed adjustment of the Contract Sum.

7.4.2 If a change in the Work must start immediately to avoid an imminent impact to the schedule of the Project, the A/E may prepare a Change Directive for the Contracting Authority's and the Owner's signatures pursuant to **Section 7.4.1**, authorizing the Contractor to proceed.

7.4.3 A Change Directive shall be used to direct a change in the Work in the absence of total agreement on the terms of a Change Order.

7.4.3.1 For the purposes of clarity, the Contract refers to a Change Directive as if it is only to be used in the absence of total agreement on the terms of a Change Order concerning the associated change of the Work. A Change Directive may also be used in the absence of agreement as to whether the subject of the Change Directive actually constitutes a change in the Work; such as the situation described under **Section 7.5.3**.

7.4.4 Upon receipt of a Change Directive, the Contractor shall promptly proceed with the change in the Work involved.

7.4.5 The Contractor may sign the Change Directiv/e to accept the proposed basis for adjustment, if any, of the Contract Sum or Contract Times, or both. Thereafter, the A/E shall prepare and the A/E, Contracting Authority, Owner, and Contractor shall promptly execute an associated Change Order as described under **Section 7.2**.

7.4.6 Within 14 days after receiving the Change Directive, the Contractor shall respond with a Proposal meeting the requirements of **Section 7.3.1** to the A/E and Contracting Authority for adjustment of the Contract Sum or Contract Times, or both, on account of the change, unless the Change Directive is performed on a time and materials basis under

Section 7.4.1.2. If the Change Directive is performed on a time and materials basis, the Contractor shall submit its Proposal within seven days after completing the Work.

7.4.6.1 The Proposal for the adjustment of the Contract Sum, if any, shall include: **(1)** written documentation as described under **Section 7.7**; and **(2)** a written statement from the Contractor that the proposed adjustment is the entire adjustment in the Contract Sum associated with the change.

7.4.6.2 The Proposal for the change in the Contract Times, if any, shall include: **(1)** written documentation as described under **Section 7.8**; and **(2)** a written statement from the Contractor that the proposed adjustment is the entire adjustment of the Contract Times associated with the change.

7.4.7 If the Contractor does not respond to a Change Directive as required under **Section 7.4.5** or **Section 7.4.6**, the Contracting Authority shall determine the adjustments, if any, of the Contract Sum and Contract Times, and the A/E shall prepare a Change Order consistent with that determination. Notwithstanding any other provision of the Contract to the contrary, that Change Order will modify the Contract Documents when it is signed by the Owner and Contracting Authority. If the Contractor does not agree with the Contracting Authority's determination, the Contractor shall initiate a Claim under **Article 8** within ten days after the date that the Contracting Authority issues its determination, and the Contractor's failure to do so shall constitute an irrevocable waiver of the Claim.

7.4.8 Pending final determination of the total adjustment of the Contract Times on account of a Change Directive, the period of time not in dispute for that change in the Work may be included in the Construction Progress Schedule accompanied by a Change Order indicating the parties' agreement with part or all of the time adjustment.

7.4.9 If the Contracting Authority, Owner, and Contractor agree on the adjustments of the Contract Sum and Contract Times associated with a Change Directive, the A/E shall prepare an appropriate Change Order within seven days after receiving the Contractor's Proposal. The A/E, Contracting Authority, Owner, and Contractor shall promptly sign the Change Order as described under **Section 7.2**.

7.4.10 If the Contracting Authority, Owner, and Contractor do not agree on the adjustments of the Contract Sum and Contract Times associated with a Change Directive within 60 days after the Change Directive is issued, the Contracting Authority shall determine the adjustments, if any, of the Contract Sum and Contract Times, and the A/E shall prepare a Change Order consistent with that determination. Notwithstanding any other provision of the Contract to the contrary, that Change Order will modify the Contract Documents when it is signed by the Owner and Contracting Authority. If the Contractor does not agree with the Contracting Authority's determination, the Contractor shall initiate a Claim under **Article 8** within ten days after the date that the Contracting Authority issues its determination, and the Contractor's failure to do so shall constitute an irrevocable waiver of the Claim.

7.5 Minor Changes in the Work

7.5.1 The A/E may order minor changes in the Work not involving adjustment of the Contract Sum or extension of the Contract Times and not inconsistent with the intent of the Contract Documents. Those changes shall be effected by written order issued to the Contractor.

7.5.2 The Contractor shall promptly carry out each order for a minor change in the Work if the Contractor agrees that the order does not involve adjustment of the Contract Sum or Contract Times, or both.

7.5.3 If the Contractor reasonably believes that it would be entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of an order for a minor change in the Work, the Contractor, within three business days after receiving the order, shall give the Contracting Authority and A/E written notice of the Contractor's position, and not proceed with the subject Work without first receiving a Change Directive or Change Order related to it.

7.5.4 The Contractor waives its right to an adjustment of the Contract Sum or Contract Times on account of an order for a minor change in the Work by:

7.5.4.1 starting the Work that is the subject of the order for a minor change in the Work; or

7.5.4.2 failing to give the notice described under **Section 7.5.3** within three business days after receiving the order for a minor change in the Work.

7.6 Differing Site Conditions

7.6.1 If the Contractor encounters a Differing Site Condition, the Contractor shall stop Work on that Differing Site Condition and give immediate written notice of the condition to the A/E and Contracting Authority.

7.6.1.1 The Contractor's failure to give notice of the Differing Site Condition as required under this **Section 7.6.1** shall constitute an irrevocable waiver of any associated Claim.

7.6.1.2 The written notice of a Differing Site Condition under this **Section 7.6.1** shall be required before the notice of Claim under **Article 8**.

7.6.2 Promptly after receiving notice from the Contractor under **Section 7.6.1**, the A/E shall investigate to determine whether the Contractor has encountered a Differing Site Condition. The A/E shall give written notice of its determination to the Contracting Authority and Contractor within ten days after completing the investigation.

7.6.2.1 If the A/E determines that the Contractor has encountered a Differing Site Condition and the Contracting Authority agrees with the A/E's determination, the A/E shall process an appropriate Change Order.

7.6.2.2 If the A/E determines that the Contractor has encountered a Differing Site Condition but the Contracting Authority disagrees with the A/E's determination, the A/E shall process an appropriate Change Directive through which the Contracting Authority may convey its disagreement with the A/E's determination.

7.6.2.3 If the A/E determines that the Contractor has not encountered a Differing Site Condition and the Contractor does not agree with that determination, the Contractor must initiate a Claim under **Article 8** within ten days after the date that the A/E issues its determination.

7.7 Change Order Cost or Credit Determination

7.7.1 General.

7.7.1.1 The maximum cost or credit resulting from a change in the Work shall be determined as described below.

- **.1** Proposals shall include the information required by **Section 7.7.1.4**.
- **.2** A Unit Price Proposal shall only be valid when incorporated into the Contract by Change Order.
- **.3** The maximum cost or credit includes all compensation for impact costs. Additional costs for impacts shall not be allowed.

7.7.1.2 The Contractor shall not assign any portion of the Work to another Person whereby the Contractor would benefit directly or indirectly from the double application of charges for overhead or profit.

> ***Example:*** Assume that **(1)** the Contractor is or is capable of self-performing general trades Work and **(2)** the change in the Work includes both electrical trade Work and general trades Work. The Contractor may not assign the general trades Work to the Contractor's electrical Subcontractor and then perform that general trades Work as a sub-subcontractor to the Contractor's electrical Subcontractor.

7.7.1.3 The Contracting Authority may require notarized invoices for material costs and may audit the records of the Contractor and Subcontractors.

7.7.1.4 For each change in the Work, the Contractor shall furnish a detailed Proposal itemized on the **Proposal Worksheet Summary Form (Contractor)** published by the Ohio Facilities Construction Commission through which the Contractor shall document the related changes in the Contract Sum as described under **Section 7.7.2**. Any Subcontractor pricing shall be itemized on the appropriate **Proposal Worksheet Summary Form**.

7.7.1.5 Section 7.7.2 establishes the exclusive and maximum amount that the Owner shall pay for any Change Order, including, but not limited to, all amounts for interference with, delay, hindrance, disruption of, or impact on the Work ("Pricing Criteria"). These Pricing Criteria also govern the value of deduct Change Orders and the Contractor's entitlement to additional compensation or damages through the Claims and dispute resolution processes on account of changes in the Work. In order to expedite the review and approval process, Proposals shall be prepared in the categories and order listed in **Section 7.7.2**.

7.7.2 Pricing Criteria.

7.7.2.1 Contractor Personnel Costs. Any cost or credit arising from a change in the quantity of the Contractor's on-Site management (including supervision and administrative personnel) not subject to prevailing wage under ORC Chapter 4115 shall be calculated on an hourly basis according to the rates acceptable to the Contracting Authority.

- **.1** In no event will the Contractor be entitled to an increase in the Contract Sum on account of Contractor Personnel Costs unless the Contractor actually incurs additional Contractor Personnel Costs solely on account of the associated change in the Work.
- **.2** Under no conditions will the increase under this **Section 7.7.2.1** exceed those additional Contractor Personnel Costs the Contractor actually incurs.

7.7.2.2 Labor. Any cost or credit arising from a change in the quantity of field labor directly involved in the Work shall be based upon the actual rate of pay to the worker. If the Project is subject to payment of prevailing wage rates, field labor shall be paid according to the relevant classification of labor as established in the applicable prevailing

wage determination for the Project locality, as determined by the Ohio Department of Commerce, Wage and Hour Bureau.

.1 In no event will the Contractor be entitled to an increase in the Contract Sum on account of labor costs unless the Contractor actually incurs additional labor costs solely on account of the associated change in the Work.

.2 Under no conditions will the increase under this **Section 7.7.2.2** exceed those additional labor costs the Contractor actually incurs.

.3 The cost for supervision above the level of working forepersons (such as general forepersons, superintendent, project manager, etc.) is included in the adjustment under **Section 7.7.2.1** for the Contractor and under **Section 7.7.2.10** for Subcontractors.

7.7.2.3 Fringes. Fringe benefit credit for labor provided under **Section 7.7.2.2** is only allowable for prevailing wage fringe benefits pursuant to ORC Chapter 4115, including, but not limited to, Health and Welfare, vacation, apprenticeship training, and certain types of pension plans. The parties shall defer to the Ohio Department of Commerce's policy on which benefits are granted fringe benefit credit. Each fringe benefit for which credit is requested shall be calculated on an hourly basis and listed as a separate line item. The Contractor shall submit documentation supporting the calculation of the amounts for each fringe benefit for each worker classification, including labor provided by Subcontractors.

7.7.2.4 Allowable Payroll Expenses. Allowable payroll expenses for labor provided under **Section 7.7.2.2** including payroll taxes as well as other benefits that are required by Applicable Law, such as federal and state Unemployment and Workers' Compensation shall each be a separate line item and shall not be credited for compliance with ORC Chapter 4115.

7.7.2.5 Equipment Rentals. Any cost or credit arising from a change in the quantity of non-owned heavy or specialized equipment shall be based on the documented rental cost, but shall not exceed 100 percent of that documented cost. No rental charges shall be allowed for hand tools, minor equipment, simple scaffolds, etc. Downtime due to repairs, maintenance, and weather delays shall not be allowed. Contractor shall submit copies of actual paid invoices to substantiate rental costs.

7.7.2.6 Owned Equipment. Any cost or credit arising from a change in the quantity of heavy or specialized equipment owned by the Contractor or Subcontractor performing the Work shall be based on the cost listed by the current edition of the Associated Equipment Distributors' *AED Green Book* heavy equipment rental rates, but shall not exceed 100 percent of that documented cost. No recovery shall be allowed for hand tools, minor equipment, simple scaffolds, etc. The longest period of time that the equipment is to be required for the Work shall be the basis for the pricing. Downtime due to repairs, maintenance, and weather delays shall not be allowed.

7.7.2.7 Trucking. Any cost or credit arising from a change in the quantity of trucking shall be based on a reasonable delivery charge or per-mile trucking charge for delivery of required materials or equipment. Charges for use of a pick-up truck shall not be allowed.

7.7.2.8 Materials. Any cost or credit arising from a change in the quantity of materials incorporated into the changed Work shall be based on the actual cost (including all discounts, rebates or related credits) of those materials. Documentation shall show costs, quantities, or Unit Prices of all items, as appropriate.

.1 The cost or credit for reusable materials (e.g., concrete form lumber, shoring, or temporary enclosures) shall be limited to 33 percent of the material cost for each use.

7.7.2.9 Contractor's General Conditions Costs. Any cost or credit arising from a change in the quantity of the Contractor's General Conditions Costs shall be limited to the extent to which the change is attributable to an associated change in the Contract Time for achievement of Substantial Completion resulting from the change in the Work.

.1 In no event shall the Contract Sum adjustment per day of Contract Time adjustment exceed an amount equal to **(1)** the sum of the General Conditions Costs line items in the Contractor's Schedule of Values approved by the Contracting Authority, **(2)** divided by the total number of days of the original Contract Time for achievement of Substantial Completion.

.2 The Contractor shall **(1)** exclude the Bond premium from the Schedule of Values for the purposes of the calculation under **Section 7.7.2.9.1**, and **(2)** include the actual adjustment of the Bond premium attributable to an associated change in the Contract Sum.

.3 If the Contractor purchases the builder's risk insurance for the Project, the Contractor shall **(1)** exclude the builder's risk insurance premium from the Schedule of Values for the purposes of the calculation under **Section 7.7.2.9.1**, and **(2)** include the actual adjustment of the builder's risk insurance premium attributable to an associated change in the Contract Sum.

7.7.2.10 Subcontractor Overhead and Profit. Any cost or credit arising from a change in Subcontractor-performed Work shall include the Subcontractor's aggregate overhead and profit allowance equal to 15 percent of the sum of the Subcontractor's costs described under **Sections 7.7.2.2** through **7.7.2.8** that are associated with that changed Work.

.1 The allowance applies to each Subcontractor tier. The Contractor is not entitled to recover overhead and profit under **Section 7.7.2.10** on account of changes in Contractor self-performed Work or Work the Contractor performs as a Subcontractor at any tier.

Example: Assume that **(1)** the Contractor is self-performing general trades Work and **(2)** the change in the Work includes both $25,000 of electrical trade Work and $10,000 of general trades Work. Under this **Section 7.7.2.10**, **(1)** the Contractor's Subcontractor would be entitled to overhead and profit mark-up but **(2)** the Contractor would not be entitled to any mark-up. Under **Section 7.7.2.11**, the Contractor would be entitled to Contractor's Fee mark-up on its self-performed Work and on the electrical Work. The amount of the Change Order would be calculated as follows: Subcontractor Change Order = $25,000 + ($25,000 x 15%) = $28,750; Contractor Change Order = $10,000 + $28,750 + (($10,000 + $28,750) x 10%) = $42,625.

.2 The allowance covers: the costs required to schedule and coordinate the Work, telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, simple scaffolds (one level high), tool breakage, tool repairs, tool replacement, tool blades, tool bits, home office estimating and expediting, home office clerical and accounting support, home office labor (management, supervision, engineering), all other home office expense, legal services, travel, and parking expenses.

.3 An exception is allowed for shop or engineering labor on items in **Section 7.7.2.10.2**, which shall not be subject to Prevailing Wage rates for steel fabricators, sheet metal fabricators, and sprinkler system fabricators performing work off Site. Recovery for these matters shall be allowed on an hourly basis under items in **Sections 7.7.2.2**, **7.7.2.3**, and **7.7.2.4** of these Pricing Criteria.

.4 An exception is allowed for field supervision labor on items in **Section 7.7.2.10.2**, for those portions of the Change Order Work that will be performed, or was performed, at times when the superintendent is not required to be on Site under **Section 6.4**, including but not limited to overtime hours due to acceleration and extensions of the Contract Times. Recovery for this matter will be allowed on an hourly basis under items in **Sections 7.7.2.2**, **7.7.2.3**, and **7.7.2.4** of these Pricing Criteria.

7.7.2.11 Contractor's Fee. Any cost or credit arising from a change in the Work shall include an allowance for the Contractor's Fee equal to **(1)** ten percent times **(2)** the sum of the costs described under **Sections 7.7.2.1** through **7.7.2.10** that are associated with that changed Work.

7.7.2.12 Miscellaneous. Any cost or credit arising from a change in Work may include the following costs with no allowance for Contractor's Fee under **Section 7.7.2.11** or Subcontractor overhead and profit under **Section 7.7.2.10**.

.1 The premium portion only for approved overtime (labor and fringes). The straight time portion is included in items in **Sections 7.7.2.2**, **7.7.2.3**, and **7.7.2.4**.

.2 State sales tax shall be allowed on items as defined by **Section 12.7**.

7.7.3 Costs that shall not be reimbursed for Change Order Work include the following:

7.7.3.1 Voluntary employee deductions including, but not limited to, deductions for charitable donations or U.S. savings bonds.

7.7.3.2 Employee profit sharing.

7.8 Time Extension

7.8.1 Every adjustment of the Contract Times associated with any change in the Work shall be determined as provided in this **Section 7.8**, which establishes the Contractor's maximum entitlement for any change in the Work, including without limitation all adjustments for interference, delay, hindrance, disruption of, or impact on the Work. This **Section 7.8** also governs time adjustments for deduct Change Orders and the Contractor's entitlement to additional time through the claims and dispute resolution processes on account of changes in the Work.

7.8.2 The Contractor shall substantiate all changes in the Contract Times with:

7.8.2.1 a written description of the nature of the interference, disruption, hindrance, or delay;

7.8.2.2 identification of Persons and events responsible for the interference, disruption, hindrance, or delay;

7.8.2.3 date or anticipated date of commencement of the interference, disruption, hindrance, or delay;

7.8.2.4 identification of activities by schedule activity number and name on the Construction Progress Schedule, which may be affected by the interference, disruption, hindrance, or delay, or new activities created by the interference, disruption, hindrance, or delay and the relationship with existing activities;

7.8.2.5 anticipated duration of the interference, disruption, hindrance, or delay and of any remobilization period;

7.8.2.6 specific number of days of extension requested and specific number of days for remobilization requested;

7.8.2.7 recommended action to avoid or minimize any future interference, disruption, hindrance, or delay; and

7.8.2.8 a detailed written proposal as described under **Section 7.7** for an increase in the Contract Sum which would fully compensate the Contractor for all costs of acceleration of the Work needed to completely overcome the associated delay, if any.

7.8.3 Critical Path. Time extensions shall depend upon the extent to which the Work on the critical path of the Construction Progress Schedule is affected, if applicable.

7.8.3.1 A Change Order granting a time extension may provide that the Contract Times shall be extended for only those specific elements so interfered with, disrupted, hindered, or delayed and related remobilization and that remaining Milestone dates shall not be altered and may further provide for adjustment of Liquidated Damages.

7.9 Examination and Audit of Contractor's Records

7.9.1 The Contracting Authority and Owner may examine all books, records, documents and other data of the Contractor and its Subcontractors related to the bidding, pricing, or performance of the Work for the purpose of evaluating any Contractor Payment Request, Proposal, Modification, or Claim.

7.9.2 The above referenced materials shall be made available at the office of the Contractor or Subcontractor, as applicable, at all reasonable times for inspection, audit, and reproduction until the expiration of six years after the date of Substantial Completion of all Work.

7.9.2.1 The Contractor shall maintain and require its Subcontractors to maintain complete and accurate business records at its principal place of business. If the principal place of business is greater than 50 miles from the Site, the Contractor shall timely make records available, and shall require its Subcontractors to timely make records available, at the office of the Contracting Authority or Owner upon request for the records.

7.9.3 To the extent that the Contractor or Subcontractor, as applicable, informs the Contracting Authority or Owner in writing that any documents provided to the Contracting Authority or Owner are trade secrets, the Contracting Authority or Owner shall treat those documents, to the extent permitted by law, as trade secrets of the Contractor or Subcontractor, as applicable.

7.9.3.1 If a dispute arises with any other Person about whether that Person should be given access to the documents, the Contractor or Subcontractor as applicable, shall indemnify the Contracting Authority and Owner against all costs, expenses, and damages, including but not limited to attorneys' fees, incurred or paid by reason of that dispute.

7.9.4 The right of inspection, audit, and reproduction extends to all documents necessary to permit adequate evaluation of the cost of pricing data submitted along with the computations and projections used therein.

7.9.5 If the Contract has been terminated in whole or in part, the records relating to the Work terminated shall be made available to the Contracting Authority or Owner for a period of six years from the date of any applicable final settlement or payment, as applicable.

7.9.6 Records that relate to disputes, litigation, or settlement of Claims arising out of the performance of the Work shall be made available until the dispute, litigation or Claims have been finally decided or settled.

ARTICLE 8 - DISPUTE RESOLUTION

8.1 Initiation of a Claim

8.1.1 Every Claim shall accrue upon the date of occurrence of the event giving rise to the Claim.

8.1.2 The Contractor shall initiate every Claim by giving written notice of the Claim to the A/E and Contracting Authority within ten days after occurrence of the event giving rise to the Claim, with the following exceptions:

8.1.2.1 The ten-day time limit on initiating a Claim arising from a determination of the Contracting Authority concerning a Change Directive begins to run on the date that the Contracting Authority issues its determination under **Section 7.4.7** or **Section 7.4.10**, as applicable.

8.1.2.2 The ten-day time limit on initiating a Claim arising from the response of the A/E to an RFI begins to run on the date that the A/E issues the A/E's response to the RFI.

8.1.2.3 The ten-day time limit on initiating a Claim arising from the A/E's determination concerning a Differing Site Condition begins to run on the date that the A/E issues the A/E's determination under **Section 7.6**.

8.1.3 The Contractor's written notice of a Claim shall provide the following information to permit timely and appropriate evaluation of the Claim, determination of responsibility, and opportunity for mitigation:

8.1.3.1 nature and anticipated amount of the impact, including all costs for any interference, disruption, hindrance, or delay, which shall be calculated in accordance with **Section 7.7** and be a fair and reasonably accurate assessment of the damages suffered or anticipated by the Contractor;

8.1.3.2 identification of the circumstances responsible for causing the impact, including, but not limited to, the date or anticipated date, of the commencement of any interference, disruption, hindrance, or delay;

8.1.3.3 identification of activities on the Construction Progress Schedule that will be affected by the impact or new activities that may be created and the relationship with existing activities;

8.1.3.4 anticipated impacts and anticipated duration of any interference, disruption, hindrance, delay, or impact, and any remobilization period;

8.1.3.5 the Contractor's planned actions to mitigate damages by avoiding interference, disruption, hindrance, delay, or impact; and

8.1.3.6 recommended action to avoid or minimize any interference, disruption, hindrance, delay, or impact.

8.1.4 The Contractor's failure to initiate a Claim as and when required under this **Section 8.1** shall constitute the Contractor's irrevocable waiver of the Claim.

8.1.5 The A/E, in consultation with the Contracting Authority, shall respond to the written notice of the Claim within a reasonable time of receipt, but not to exceed ten days.

8.2 Substantiation of Claims

8.2.1 Within 30 days after the initiation of a Claim, the Contractor shall submit four copies of all information and statements required to substantiate a Claim as provided in this **Article 8** and all other information that the Contractor believes substantiates the Claim. The Contractor shall file the four copies by delivery of one copy to the A/E, one copy to the Owner, and two copies to the Contracting Authority.

8.2.2 The Contractor shall substantiate all of its Claims by providing the following minimum information:

8.2.2.1 a narrative of the circumstances, which gave rise to the Claim, including without limitation the start date of the event or events and the actual or anticipated finish date;

8.2.2.2 detailed identification of the Work (e.g., activity codes from the Construction Progress Schedule) affected by the event giving rise to the Claim;

8.2.2.3 copies of the Contractor's daily log (**Section 6.2.17**) for each day of impact;

8.2.2.4 copies of relevant correspondence and other information regarding or supporting Contractor entitlement;

8.2.2.5 copies of the Contractor's most recent income statement, including segregated general and administrative expenses for the most recent reporting period, and for the period of the Contract, if available, and similar information for any Subcontractor claim included; and

8.2.2.6 the notarized certification described under **Section 8.5.1.1**.

8.2.3 The Contractor's failure to comply with the requirements of this **Section 8.2** shall constitute an irrevocable waiver of any related Claim.

8.3 Substantiation of Claims for Increase of the Contract Sum

8.3.1 The Contractor shall substantiate each Claim for an increase of the Contract Sum with:

8.3.1.1 written documentation as described under **Section 7.7** of the actual additional direct and indirect costs to the Contractor due to the event giving rise to the Claim;

8.3.1.2 a written statement from the Contractor that the increase requested is the entire increase in the Contract Sum associated with the Claim; and

8.3.1.3 the general substantiation documentation described under **Section 8.2**.

8.3.2 The Contractor's failure to comply with the requirements of this **Section 8.3** shall constitute an irrevocable waiver of any related Claim.

8.4 Substantiation of Claims for Extension of the Contract Times

8.4.1 The Contractor shall substantiate each Claim for an extension of the Contract Times with:

8.4.1.1 written documentation as described under **Section 7.8** of the actual delay to the critical path of the Construction Progress Schedule due to the event giving rise to the Claim;

8.4.1.2 a detailed written Proposal as described under **Section 7.7** for an increase in the Contract Sum that would fully compensate the Contractor for all costs of acceleration of the Work needed to completely overcome the associated delay together with a statement consistent with **Section 8.3.1.2**;

8.4.1.3 a written statement from the Contractor that the extension requested is the entire extension of the Contract Times associated with the Claim; and

8.4.1.4 the general substantiating documentation described under **Section 8.2**.

8.4.2 In addition to the requirements of **Section 8.4.1**, if adverse weather conditions are the basis for a Claim for additional time, the Contractor shall document the Claim with data substantiating that weather conditions were abnormal for the period, could not have been reasonably anticipated, and had an adverse effect on a critical element of the scheduled construction. The support for and evaluation of all adverse weather Claims shall be based upon average weather conditions during the five years immediately preceding the dates at issue in the Claim as those weather conditions were recorded at the government-controlled weather-recording facility nearest to the Site.

8.4.3 The Contractor's failure to comply with the requirements of this **Section 8.4** shall constitute an irrevocable waiver of any related Claim.

8.5 Certification of the Claim

8.5.1 The Contractor shall certify each Claim within 30 days after initiating the Claim under **Section 8.1** or before Contract Completion, whichever is earlier, by providing the notarized certification specified in **Section 8.5.1.1**, signed and dated by the Contractor:

8.5.1.1 "The undersigned Contractor certifies that the Claim is made in good faith; that the supporting data is accurate and complete to the best of the Contractor's knowledge and belief; that the amount of money, time, or both requested is a fair, reasonable, and necessary adjustment for which the Contractor believes the State is liable; that the amount of money, time, or both requested is the entire amount of money, time, or both to which the Contractor is entitled on account of the Claim and for which the Contractor believes the State is liable; and that the undersigned is duly authorized to certify the Claim on behalf of the Contractor."

8.5.2 The date that the Contractor's certified and fully substantiated Claim is received by the Contracting Authority, or the date that the Contractor is required to certify and fully substantiate a Claim pursuant to **Sections 8.2.1** and **8.5.1**, shall trigger the 120-day period for exhaustion of administrative remedies pursuant to ORC Section 153.16(B).

8.5.3 The Contractor's failure to comply with the requirements of this **Section 8.5** shall constitute an irrevocable waiver of any related Claim.

8.6 Delay and Delay Damage Limitations; Derivative Claims

8.6.1 Subject to other provisions of the Contract, the Contractor will be entitled only to an extension of the Contract Times on account of delay in the commencement or progress of Work on the critical path of the Construction Progress Schedule caused by acts of Nature or the public enemy, acts of the government not arising from the Contractor's failure to comply with Applicable Law, fires, floods, epidemics, weather, and labor disputes beyond the Contractor's control.

8.6.2 Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum, or an extension of the Contract Times, or both:

8.6.2.1 on account of the impact of any normal adverse weather on any of the Work or on account of the impact of any abnormal adverse weather on Work not on the critical path;

8.6.2.2 to the extent that a delay occurs concurrently with a delay attributable to the Contractor; or

8.6.2.3 on account of the delay of any Work not on the critical path.

8.6.3 Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum or any type of damages on account of a delay in the commencement or progress of

Work on the critical path unless **(1)** the delay is caused by the Owner and **(2)** the delay was not authorized or permitted under the Contract.

8.6.4 Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum or any type of damages arising from a delay in the commencement or progress of any of the Work caused by the occurrence or non-occurrence of an event beyond the Owner's control such as acts of Nature or the public enemy, acts of the government, fires, floods, epidemics, labor disputes, unusual delivery delays, weather, or damages caused by the Contractor.

8.6.5 Derivative Claims. Notwithstanding any other provision of the Contract to the contrary, if the Owner prosecutes a claim, suit, or appeal against a Separate Consultant or Separate Contractor to recover damages the Contractor suffers on account of the acts or neglects of a Separate Consultant or Separate Contractor or a person or entity for whom either is legally responsible, the Owner's liability to the Contractor shall not exceed the amount the Owner actually recovers from the Separate Consultant or Separate Contractor on account of those damages less the costs the Owner incurs recovering them. The Owner is not obligated to prosecute any such claim, suit, or appeal.

8.7 Liquidated Damages

8.7.1 If the Contractor fails to achieve a Milestone within the associated Contract Time, it would be difficult, if not impossible, to determine the Owner's resulting damages. Therefore, if the Contractor fails to achieve a Milestone within the associated Contract Time, the Contractor shall (at the Owner's option) pay to or credit the Owner the Liquidated Damages per day sum determined according to the following schedule for each day that the Contractor fails to achieve a Milestone within the associated Contract Time. If the Project involves more than one Phase as explicitly identified in the Agreement, the Contract Sum in the below schedule refers to the total Contract Sum for each of the Phases individually as opposed to the aggregate Contract Sum for all Phases.

Contract Sum	Liquidated Damages per day for Milestones other than the Punch List Milestone	Liquidated Damages per day for the Punch List Milestone
Less than $1,000,000	$500	$125
From $1,000,000.01 to $2,000,000	$1,000	$250
From $2,000,000.01 to $5,000,000	$2,000	$500
From $5,000,000.01 to $10,000,000	$5,000	$1,250
From $10,000,000.01 to $20,000,000	$7,500	$1,875
From $20,000,000.01 to $50,000,000	$10,000	$2,500
More than $50,000,000	$15,000	$3,750

8.7.2 If the Contractor simultaneously fails to achieve two or more Milestones, the Owner shall be entitled to recover the sum of the associated Liquidated Damages per day rates.

8.7.3 The Liquidated Damages described in this **Section 8.7** are only intended to compensate the Owner for the direct damages it incurs as a result of the Contractor's failure to achieve the Milestones within their associated Contract Times.

8.7.4 The Liquidated Damages described in this **Section 8.7** are not intended to compensate the Owner for any damages the Owner incurs on account of **(1)** any claims attributable to the Contractor that are brought by others including Separate Consultants and Separate Contractors or **(2)** any failure of the Contractor to timely, properly, and completely perform the Contract other than the failure to achieve the Milestones within their associated Contract Times.

8.7.5 The parties acknowledge that the above-listed Liquidated Damages per day sums are not penalties, and they each irrevocably waive the right (if any) to challenge the validity and enforceability of those Liquidated Damages per day sums. Notwithstanding any other provision of the Contract Documents to the contrary, if a court determines that the Liquidated Damages per day sums or their application are void and unenforceable, the Owner shall be entitled to recover the actual damages that it incurs on account of the Contractor's failure to achieve one or more of the Milestones within the Contract Times.

8.7.6 In addition to other rights that the Owner may have relative to the Liquidated Damages, the Contracting Authority may deduct the Liquidated Damages from the Contract Sum as the damages accrue. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall immediately pay the amount of the insufficiency to the Owner.

8.8 Mutual Waiver of Consequential Damages

8.8.1 Except as provided under **Section 8.8.2**, the Owner and Contractor each waive against the other all Claims for consequential damages that may arise out of or relate to this Contract.

8.8.1.1 The Owner's waiver includes Claims for loss of use, income, profit, revenue, financing, cost of capital, business and reputation, management and employee productivity, and consequential damages arising from termination of the Contract or related to insolvency.

8.8.1.2 The Contractor's waiver includes Claims for unabsorbed home-office overhead; any other form of overhead in excess of that specifically provided for under **Section 7.7**; delay damages except as otherwise specifically provided for in **Section 8.6**; increased cost of funds for the Project; lost opportunity to work on other projects; losses of financing, business, and reputation; loss of profit except anticipated profit arising directly from properly performed Work; loss of bonding capacity; and consequential damages arising from termination of the Contract or related to insolvency.

8.8.2 Notwithstanding **Section 8.8.1**, this **Section 8.8**:

8.8.2.1 does not apply to any damages that would be covered by insurance provided in connection with the Project if the Contract did not include **Section 8.8.1;**

8.8.2.2 does not apply to the Contractor's indemnity obligations for third-party claims against the Indemnified Parties even if those claims are for damages that **Section 8.8.1** would otherwise preclude;

8.8.2.3 does not preclude the Owner's recovery of Liquidated Damages under **Section 8.7**; and

8.8.2.4 does not apply to Claims for damages arising from the Owner's or the Contractor's gross negligence or willful misconduct.

8.8.3 This **Section 8.8** shall survive termination of the Contract.

8.9 Review of the Claim

8.9.1 The A/E shall review the Claim and prepare a written analysis of its content, which shall include:

8.9.1.1 a narrative of the A/E's examination of the facts giving rise to the Claim;

8.9.1.2 identification of relevant Contract Documents and language;

8.9.1.3 an analysis of whether the Contractor complied with the requirements of the Contract Documents pertaining to Claim initiation and substantiation including, without limitation, the issues of entitlement to, and calculation of, adjustments of the Contract Sum, Contract Times, or both;

8.9.1.4 an analysis of claimed additional labor, materials, and equipment for the scope of the Work items described;

8.9.1.5 an analysis of any time extension for any interference, disruption, hindrance, impact, or delay claimed (to include the calculation of any concurrent delays affecting entitlement);

8.9.1.6 a concluding opinion regarding Contractor entitlement to, and the appropriateness and reasonableness of all, or any part of, the Claim; and

8.9.1.7 an appendix containing copies of contemporaneous documentation supporting the concluding opinion.

8.9.2 The A/E shall submit the written analysis to the Project Manager no more than 30 days after receiving the Contractor's substantiated and certified Claim.

8.10 Claim Decision

8.10.1 The Project Manager shall examine the Contractor's Claim and A/E's analysis.

8.10.2 The Project Manager shall approve or deny all, or any part, of the Contractor's Claim and forward a written decision to the Contractor, A/E, Owner, and Contracting Authority within 14 days after receiving the A/E's analysis. The Project Manager may employ independent resources to assist in its review, or refer evaluation of the Claim to a consultant.

8.10.3 If the Contractor and Owner agree with the Project Manager's decision, the decision shall be incorporated into a Change Order.

8.10.4 Any Claim remaining unresolved after completion of the process described under this **Section 8.10** shall be subject to Claim decision review as described under **Section 8.11**.

8.11 Claim Decision Review

8.11.1 The Contractor may request review of the Project Manager's decision by written notice delivered by certified mail within 14 days after the Project Manager's decision.

8.11.1.1 If the Project is administered by the Commission, jointly administered by the Commission and a public school district, or locally administered by authority granted to an agency of the state of Ohio by the Commission, the written notice shall be delivered to the Executive Director of the Commission.

8.11.1.2 If the Project is locally administered by an Institution of Higher Education under ORC Section 3345.50 or ORC Section 3345.51, the written notice shall be delivered to the Institutional Designee who will review the Project Manager's decision instead of the Commission.

8.11.2 The Commission or Institutional Designee, as applicable, shall schedule and conduct a meeting within 30 days after receiving the Contractor's request for review. The Commission or Institutional Designee may employ independent resources to assist in the meeting and review.

8.11.3 The Commission or Institutional Designee, as applicable, shall determine the final disposition of the Contractor's request for review and provide a written decision to the Contractor and Owner within 14 days after the meeting.

8.11.4 The decision of the Commission or Institutional Designee is the final administrative decision of the Contracting Authority as described under ORC Section 153.12(B).

8.11.5 If the Contractor and Owner agree with the Commission's or the Institutional Designee's decision, the decision shall be incorporated into a Change Order.

8.11.6 Any Claim remaining unresolved after completion of the process described under this **Section 8.11** shall be subject to litigation, which may be preceded by Alternative Dispute Resolution ("ADR") as described under **Section 8.13**.

8.12 Delegation

8.12.1 No provision of this **Article 8** shall prevent the Executive Director from delegating the duties or authorities of the Commission to any other person selected at the Executive Director's sole discretion.

8.13 Alternative Dispute Resolution

8.13.1 At any point in the Claims and dispute-resolution processes, the Project's key stakeholders may agree to enter into non-binding ADR including progressive negotiation, Dispute Review Board, mediation, or another non-binding ADR procedure accepted by all of the Project's key stakeholders.

8.14 Audit of the Claim

8.14.1 All Claims shall be subject to audit at any time following filing of the Claim, whether or not the Claim is part of a lawsuit.

8.14.2 The audit may be performed by employees of the Contracting Authority or by a consultant engaged by the Contracting Authority.

8.14.3 The audit may begin upon ten-days' notice to the affected Contractor or affected Subcontractor.

8.14.4 The Contractor shall cooperate with the request.

8.14.5 Failure of the Contractor or Subcontractor to produce sufficient records to allow the Contracting Authority to audit and verify a Claim shall constitute an irrevocable waiver of the Claim or portion of the Claim that could not be completely audited.

8.14.6 The Contractor shall make available to the Contracting Authority all Contractor and Subcontractor documents related to the Claim including, without limitation, the following documents:

8.14.6.1 daily time sheets and superintendent's daily reports;

8.14.6.2 union agreements, if any, and employer agreements;

8.14.6.3 insurance, welfare, fringes, and benefits records;

8.14.6.4 payroll register;

8.14.6.5 earnings records;

8.14.6.6 payroll tax returns;

8.14.6.7 material invoices, purchase orders, Subcontracts, and all material and supply acquisition contracts;

8.14.6.8 material cost distribution worksheets;

8.14.6.9 equipment records (list of Contractor equipment, rates, etc.);

8.14.6.10 vendor rental agreements and Subcontractor invoices;

8.14.6.11 Subcontractor payment certificates;

8.14.6.12 canceled checks (payroll and vendors);

8.14.6.13 job cost report;

8.14.6.14 job payroll ledger;

8.14.6.15 general ledger, general journal (if used), and all subsidiary ledgers and journals together with all supporting documentation pertinent to entries made in those ledgers and journals;

8.14.6.16 cash disbursements journal;

8.14.6.17 financial statements for all years reflecting operations on the Project;

8.14.6.18 income tax returns for all years reflecting operations on the Project;

8.14.6.19 depreciation records on all equipment utilized whether the records are maintained by the Contractor, its accountant, or others;

8.14.6.20 if a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all other source documents;

8.14.6.21 all documents that reflect the Contractor's actual profit and overhead during the years the Project was being performed;

8.14.6.22 all documents related to the preparation of the Contractor's Bid(s), including the final calculations on which the Bid was based, unless the documents are placed in escrow under provisions of the Instructions to Bidders;

8.14.6.23 all documents that relate to the Claim together with all documents that support the amount of damages as to the Claim;

8.14.6.24 worksheets used to prepare the Claim establishing the cost components for items of the Claim including, but not limited to, labor, fringes, benefits and insurance, materials, equipment, Subcontractors, and all documents that establish the periods of time, individuals involved, the hours and rate of pay for the individuals; and

8.14.6.25 all other documents required by the Contracting Authority to reasonably review the Claim.

8.15 False Certification of the Claim

8.15.1 If the Contractor falsely certifies all or any part of a Claim, the portion of the Claim falsely certified shall be denied, and may be sufficient cause for the State to debar the Contractor from future State contracting opportunities as permitted by Applicable Law.

8.16 Performance and Payment

8.16.1 The Contractor shall proceed with the Work during any dispute resolution process, unless otherwise agreed by the Contractor and Contracting Authority in writing.

8.16.2 The Contracting Authority shall continue to make payment of any undisputed amounts in accordance with the Contract Documents pending final resolution of a Claim, unless otherwise agreed by the Contractor and Contracting Authority in writing.

ARTICLE 9 - COMPENSATION AND PAYMENT

9.1 Allowances

9.1.1 The Contract Sum includes the Allowances (if any) identified in the Contract.

9.1.2 All Allowances include the cost to the Contractor (less any applicable trade discounts) of materials and equipment required by the Allowances to be delivered at the Site, and all applicable taxes.

9.1.3 The Contractor's Fee and costs for unloading and handling on the Site, labor, installation costs, and other expenses contemplated for the Allowances are not in the stated Allowance amounts but are otherwise included in the Contract Sum.

9.1.4 Before final payment, an appropriate Change Order will be issued to reconcile the Contract Sum so that it reflects actual amounts due to the Contractor on account of Work covered by Allowances.

9.2 Unit Prices

9.2.1 Where the Contract provides that all or part of the Work is to be Unit Price Work, initially the Contract Sum will include for all Unit Price Work **(1)** an amount equal to the sum of the established Unit Prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract plus **(2)** the Contractor's Fee on that Unit Price Work.

9.2.2 The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Sum. The Contracting Authority will determine the actual quantities and classifications of Unit Price Work performed by Contractor.

9.2.3 The Contractor's Fee on account of Unit Price Work is not in the stated Unit Price amounts but are otherwise included in the Contract Sum.

9.2.4 Before final payment, an appropriate Change Order will be issued as described under **Section 7.1.5** to reconcile the Contract Sum so that it reflects actual amounts due to the Contractor on account of Unit Price Work actually performed.

9.3 Schedule of Values

9.3.1 Within ten days after receipt of the Notice to Proceed, or other period as mutually agreed by the Contractor and Contracting Authority, the Contractor shall submit to the A/E a Schedule of Values on a form published by the Commission, with separate amounts shown for labor and materials for each branch of Work, following the numbers and titles of the Construction Specifications Institute's *MasterFormat* for individual work results, or *UniFormat* for assemblies in place.

9.3.1.1 The Contractor shall clearly indicate on the Schedule of Values, the amount(s) allocated, including separate items for Contractor's Fee (overhead and profit), for each EDGE-certified Business used in the performance of the Work. The amount(s) shall indicate labor and materials, as appropriate.

9.3.2 The grand total shown on the Schedule of Values shall equal the total Contract Sum. The Contracting Authority may use the approved Schedule of Values to determine the cost or credit to the Owner resulting from any change in the Work.

9.3.2.1 The first items shall be a breakdown of General Conditions Costs.

9.3.2.2 The amounts for labor and materials shall accurately reflect the cost for each item. Separate items shall not be shown for Contractor's Fee, except when Work is performed or materials are supplied by an EDGE-certified Business, pursuant to **Section 9.3.1.1**. Contractor's Fee shall be included in the totals for labor and materials.

9.3.2.3 If the material allocation exceeds 55 percent of the Contract Sum, the Contractor shall provide, upon request, sufficient information to support the higher percentage.

9.3.2.4 Subcontract Work shall show amounts for labor and materials. Fringe benefits shall be shown as a part of labor costs.

9.3.2.5 When more than one major structure is included in the Work, the Contractor shall subdivide the Schedule of Values accordingly, with cost details for each structure shown separately.

9.3.2.6 The line items shall be coordinated with line items in the Project Schedule, which may require division of items of Work by area of the Project by floor, phase, or other appropriate area.

9.3.2.7 Mechanical and electrical Work shall be included in separate line items for all major pieces of equipment, and group smaller equipment items by type.

9.3.2.8 Line items shall be included for each Allowance, Coordination Drawings, Punch List Work, Project Record Document Submittals, delivery of attic stock, and specified demonstrations and training.

9.3.3 The A/E may return the Schedule of Values to the Contractor for re-submittal if it does not meet the requirements or contains insufficient items or details of the Work, or approve the Schedule of Values if the A/E determines that it conforms to this **Section 9.3**.

9.3.4 No payment shall be made until the A/E has approved the Contractor's Schedule of Values.

9.4 Contractor Payment Request

9.4.1 The Contractor may submit a Contractor Payment Request for Work performed based upon the Schedule of Values to the A/E each month or upon another interval approved by the Contracting Authority. When the rate of Work and amount involved is sufficient that it is considered appropriate by the Contracting Authority, the Contractor may submit Contractor Payment Requests twice a month.

9.4.1.1 The Contractor shall support each Contractor Payment Request with documentation substantiating the Contractor's right to payment. The Contractor shall supply additional documentation as the A/E may request in connection with each payment to the Contractor.

9.4.1.2 The Contracting Authority may require proof of the renewal of required insurance as a condition precedent to payment.

9.4.1.3 The Contractor shall attach certified payroll reports for the relevant period to one copy of each Contractor Payment Request, see **Document 00 73 43 - Prevailing Wage Requirements**.

9.4.1.4 The Contractor may list on the Contractor Payment Request any Change Orders approved and performed prior to submission of the Contractor Payment Request.

9.4.1.5 The Contractor shall submit its Contractor Payment Request using the Contractor Payment Request form or forms current at the time of each application and as provided by the Contracting Authority in the manner prescribed by the Contracting Authority.

9.4.1.6 The Contractor shall submit one draft copy of its Contractor Payment Request ("Pencil Copy") to the A/E not less than one week prior to submitting multiple copies of its Contractor Payment Request. The A/E shall review the Pencil Copy and provide comments to the Contractor within three days after receiving it. The Contractor shall incorporate the A/E's comments into its Contractor Payment Request prior to submitting multiple copies for payment.

9.4.1.7 The Contractor shall clearly indicate on the Contractor Payment Request, the amount(s) requested for each EDGE-certified Business used in the performance of the Contract. The amount(s) shall indicate labor and materials, as appropriate.

9.4.1.8 The Contractor shall submit an electronic copy of the Contractor Payment Request to the A/E with its paper copies of the Contractor Payment Request for collection and reporting of information used for contract compliance evaluation and statistical purposes. The Contractor may issue the copy in any electronic media acceptable to the Contracting Authority.

9.4.2 Payments for Unit Price Work shall be made to the Contractor only for the authorized actual quantities of Work performed or materials furnished in accordance with the Contract Documents.

9.4.3 Subject to **Section 9.8**, the Owner shall pay an approved Contractor Payment Request within 30 days after the date the A/E recommends acceptance of the Contractor Payment Request.

9.4.4 Notwithstanding any other provision of the Contract Documents, partial payments made pursuant to this **Section 9.4** constitutes neither acceptance of any Defective Work, nor a waiver of any rights set forth in the Contract Documents or otherwise provided by Applicable Law.

9.4.5 The Contracting Authority and Owner may audit Contractor Payment Requests as described under **Section 7.9**.

9.5 Labor Payments

9.5.1 Partial payments to the Contractor for labor shall be made at the rate of 92 percent of the amount invoiced through the Contractor Payment Request that shows the Work is 50 percent complete.

9.5.2 After the Work is 50 percent complete, as evidenced by payments of at least 50 percent of the Contract Sum including approved Change Orders to date, no additional funds shall be retained from payments for labor.

9.5.3 If the Project involves more than one Phase as explicitly identified in the Agreement, this **Section 9.5** will apply on a per-Phase basis.

9.6 Material Payments

9.6.1 The Owner shall pay the Contractor at the rate of 100 percent of the scheduled value for materials incorporated into the Project.

9.6.2 The Owner shall pay the Contractor at the rate of 92 percent of the invoice cost, not to exceed the scheduled value in a Unit Price or lump sum Contract, for materials delivered to the Site, or other off-site storage location approved by the A/E, provided the Contractor provides the following information with the Contractor Payment Request:

9.6.2.1 a list of the fabricated materials consigned to the Project, giving the place of storage, together with copies of invoices verifying quantity and cost, written evidence of insurance covering the off-site stored materials; and

9.6.2.2 a certification of materials stored off-site, prepared by the Contractor and signed by the A/E to evidence that the materials are in conformity with the Specifications and have been tagged with the Project name and number for delivery to the Project. The Contractor shall directly reimburse the A/E for all costs incurred to visit a storage site, other than the areas adjacent to the Project.

9.6.2.3 The Owner shall pay the balance of the scheduled value when the materials are incorporated into and become a part of the Project.

9.6.3 When payment is allowed for materials delivered to the Site or other approved off-site storage location but not yet incorporated into the Project, the materials are the property of the Owner.

9.6.3.1 The Owner may, at its sole discretion, retain any material not ultimately incorporated into the Project or return it to the Contractor for credit of an amount proportionate to the value of the extra materials.

9.7 Retainage

9.7.1 If the total Contract Sum is $15,000 or more, when the Contract is 50 percent complete, all funds retained for faithful performance of the Work, in accordance with **Section 9.5.1**, shall be deposited in an escrow account with a bank in the state in accordance with the terms and conditions provided in an escrow agreement executed by the Contractor, Contracting Authority, and applicable bank.

9.7.2 When the Contractor has achieved Substantial Completion of all Work, and there is no other reason to retain funds; upon request of the Contractor, the funds retained in connection with that Work shall be released from escrow and paid to the Contractor, withholding only that amount necessary to assure faithful completion in the sole discretion of the Contracting Authority, including but not limited to compliance with **Section 6.25.2**.

9.7.3 Upon consent by the Contractor's Surety, the Contracting Authority may reduce the amount of funds retained for the faithful performance of Work by 50 percent of the amount of funds required to be retained, provided the Contractor's Surety remains responsible for all damages that may be caused due to default by the Contractor, including, but not limited to, the following:

9.7.3.1 completion of the Work;

9.7.3.2 all interference, disruption, hindrance, and delay claims;

9.7.3.3 all Liquidated Damages; and

9.7.3.4 all additional expenses incurred by the State.

9.7.4 If the Project involves more than one Phase as explicitly identified in the Agreement, this **Section 9.7** will apply on a per-Phase basis.

9.8 Payments Withheld

9.8.1 The A/E may recommend to the Contracting Authority that payments be withheld from, or Liquidated Damages be assessed against, a Contractor Payment Request.

9.8.2 The Contracting Authority may decline to approve any Contractor Payment Request or part thereof, or nullify any previous Contractor Payment Request, in whole or in part, to the extent necessary in the Contracting Authority's sole opinion to protect the Owner from loss because of:

9.8.2.1 Defective Work not remedied;

9.8.2.2 damage caused by the Contractor;

9.8.2.3 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

9.8.2.4 reasonable evidence that the Work will not be completed within the Contract Times, and that the unpaid balance would not be adequate to cover damages under the Contract Documents for the anticipated delay;

9.8.2.5 failure to comply with Applicable Law including, but not limited to, the requirements of ORC Chapter 4115;

9.8.2.6 failure to timely submit EDGE Participation Reports in accordance with **Section 1.8.2**;

9.8.2.7 failure to timely identify the Contractor's proposed Subcontractors in accordance with **Section 4.1.1**;

9.8.2.8 failure to timely fulfill the Contractor's obligations related to the Construction Progress Schedule;

9.8.2.9 failure to carry out the Work in accordance with the Contract Documents; or

9.8.2.10 that which is permitted under other provisions of the Contract Documents.

9.8.3 If the Contractor remedies the basis for withholding payment under **Section 9.8.2** to the Contracting Authority's satisfaction, the Owner shall pay the amounts withheld.

9.9 Final Contractor Payment Request

9.9.1 The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and to final payment, shall complete all requirements of the Contract Documents.

9.9.1.1 The Contractor and each of its Subcontractors, regardless of tier, shall execute a Payment Release Affidavit to certify that the Contractor and each of its Subcontractors, regardless of tier, have complied with all requirements of ORC Chapter 4115, and to certify that all of its Subcontractors have been paid in full for all Work performed or materials furnished for the Project.

9.9.2 The Owner shall pay the final Contractor Payment Request within 30 days after the date the A/E recommends acceptance of the final Contractor Payment Request.

9.9.3 Acceptance of final payment by the Contractor or a Subcontractor constitutes the payee's waiver of all claims against the State except those previously made in writing under **Article 8** and identified by that payee as unsettled at the time of the final Contractor Payment Request.

ARTICLE 10 - BONDS, INSURANCE, AND INDEMNIFICATION

10.1 Payment and Performance Bonds

10.1.1 Before signing the Agreement, the Contractor shall provide the Bond required under Applicable Law and below:

10.1.1.1 If the Contractor provided **Document 00 43 13 - Bid Security Form** as its Bid Guaranty, then that form shall be the Bond.

10.1.1.2 If the Contractor provided another form of Bid Guaranty, then **Document 00 61 13 - Performance and Payment Bond Form** shall be the Bond.

10.1.1.3 Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Contracting Authority.

10.1.1.4 If there is more than one Surety under the Bond, each of them shall be jointly and severally liable as surety under the Bond.

10.1.1.5 Unless the Contracting Authority and the Owner are the same entity, the Bond shall name as co-obligees **(1)** the State by and through the Contracting Authority and **(2)** the Owner.

- **.1** If any document is used to name the required co-obligees of the Bond (e.g., a form commonly known as a "dual obligee rider"), that document will not alter the terms of the Contract in any way or the terms of the Bond in any way beyond merely naming the co-obligees notwithstanding any term of that document to the contrary.
- **.2** The Surety will not be obligated to more than the Penal Sum of any Bond solely on account of the existence of more than one obligee under that Bond.

10.1.1.6 The penal sum of the Bond, when initially submitted, shall be equal to one-hundred percent of the Contract Sum.

10.1.2 The Contractor shall submit with the executed Bond **(1)** a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and **(2)** a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

10.1.3 If the Contract Sum increases at any time such that it exceeds the penal sum of the Bond, the Contractor shall cause the penal sum of the Bond to be increased such that the penal sum equals one-hundred percent of the increased Contract Sum.

10.1.4 Any time the Contractor increases the penal sum of the Bond under **Section 10.1.3**, the Contractor shall deliver to the Contracting Authority an Acknowledgment of Surety from the affected Surety or Sureties to evidence the Surety's or Sureties' receipt of notice of the increased penal sum.

10.1.4.1 The Contracting Authority's receipt of the required Acknowledgement(s) of Surety is a condition precedent to the Owner's obligation to pay the Contractor for any portion of the Work associated with the increase of the penal sum.

10.1.4.2 The Contractor's failure to submit a required Acknowledgment of Surety or a Surety's failure or refusal to provide an Acknowledgment of Surety will not relieve the Surety of its obligation for the increased penal sum.

10.1.4.3 If any Surety fails or refuses to provide a required Acknowledgement of Surety, the Contracting Authority may require the Contractor to deliver to the Contracting Authority a new Bond showing the increased penal sum and written consent of the affected Surety or Sureties confirming the increased penal sum. In that event, the Contracting Authority's receipt of replacement Bonds will be a condition precedent to the Owner's obligation to pay the Contractor for any portion of the Work associated with the increase of the penal sum.

10.1.4.4 Each Acknowledgment of Surety shall be **(1)** on a form provided by the Contracting Authority and **(2)** subject to the acceptance of the Contracting Authority.

10.1.5 If at any time prior to final payment, any surety providing a Bond for the Project **(1)** is adjudged bankrupt or has made a general assignment for the benefit of its creditors; **(2)** has liquidated all assets or has made a general assignment for the benefit of its creditors; **(3)** is placed in receivership; **(4)** otherwise petitions a state or federal court for protection from its creditors; or **(5)** allows its license to do business in Ohio to lapse or to be revoked, then the Contractor shall, within 21 days after any such action listed above, provide the Contracting Authority with a new Bond in the form and amount described in this **Section 10.1**. The Contracting Authority's receipt of a replacement Bond is a condition precedent to the Owner's obligation to pay the Contractor.

10.1.6 If notice of any change affecting the Contract is required by any Surety or by the provision of any Bond, the Contractor shall provide that notice.

10.2 Contractor's General Insurance Requirements

10.2.1 Throughout the performance of the Work or longer as may be described below, the Contractor shall obtain, pay for, and keep in force, the minimum insurance coverage described in this **Article 10**.

10.2.1.1 Each requirement of this **Article 10** applies to Subcontractors just as it applies to the Contractor.

10.2.1.2 If a Subcontractor's usual insurance coverage does not meet the minimum coverage requirements, before entering into an agreement with that Subcontractor, the Contractor shall submit to the Contracting Authority **(1)** a certificate of insurance evidencing the insurance the Subcontractor will carry without additional compensation and **(2)** if the Contracting Authority requests, a written proposal from the Subcontractor to provide coverage that meets the minimum coverage requirements. The Contracting Authority will decide whether to accept the non-conforming insurance coverage or the proposal to provide conforming coverage.

.1 Notwithstanding any other provision of the Contract to the contrary, the Contractor will not be entitled to any increase of the Contract Sum, Contract Times, or both on account of the Contracting Authority's refusal to accept a Subcontractor's nonconforming insurance coverage.

10.2.1.3 On a case-by-case basis, the Contracting Authority and Contractor may agree to adjust the below requirements for any particular Subcontractor.

10.2.2 Before starting the Work on the Site, upon renewal of any policy, and upon a change of any insurance carrier, the Contractor shall deliver to the Contracting Authority certificates evidencing that the required insurance is in force.

10.2.2.1 Certificates of insurance for other than government-controlled workers' compensation insurance shall identify **(1)** all below-required additional insureds and **(2)** the Project name.

10.2.3 With the exception of government-controlled workers' compensation coverage:

10.2.3.1 the Contractor shall place the insurance with companies that **(1)** are satisfactory to the Contracting Authority, **(2)** hold an A.M. Best Rating of A-, X, or higher, and **(3)** are authorized to conduct business in Ohio;

10.2.3.2 the policies shall be endorsed to require the Contractor's insurance carrier to **(1)** provide 30-days' written notice to the Contracting Authority (as certificate holder) of the cancellation or non-renewal of the insurance and **(2)** provide at least ten-days' written notice to the Contracting Authority (as certificate holder) of the cancellation of the insurance for non-payment of premium; and

10.2.3.3 within 30 days after the Contracting Authority's request, the Contractor shall submit insurance-company certified copies of the policies, the policy endorsements, loss-run reports, or all three.

10.2.4 The Contractor shall pay all deductibles, or self-insured retentions, or both contained in the Contractor's policies of insurance required or provided in connection with the Project. The Contracting Authority reserves the right to approve

or reject all levels of self-insured retention, captive insurance programs, or other alternative risk financing the Contractor may use to comply with any insurance requirement.

10.2.5 The Contractor shall pay a proportionate share of the deductibles, or self-insured retentions, or both contained in any insurance policy the Contracting Authority purchases for the Project. The Contractor's proportionate share will derive from the percentage of the associated claim or loss attributable to the alleged or actual negligence of the Contractor or a Subcontractor.

10.2.6 The Contracting Authority and Owner do not represent that required coverage or limits are adequate to protect the Contractor.

10.2.7 Failure of the Contracting Authority to demand a certificate or other evidence of full compliance with the insurance requirements or failure of the Contracting Authority to identify a deficiency from evidence that is provided shall not be construed as a waiver of the Contractor's obligation to maintain the required insurance.

10.2.8 The Contracting Authority may terminate the Contract for cause on account of the Contractor's failure to maintain required insurance.

10.3 Contractor's Minimum Coverage Requirements

10.3.1 Workers Compensation. The Contractor shall maintain workers' compensation coverage meeting the requirements of Applicable Law including, without limitation, the Jones Act and the Longshore & Harbor Workers Compensation Act if Work involves hazards arising from work on or near navigable waterways, including vessels and docks.

10.3.2 Employers' Liability Coverage. The Contractor shall maintain employers' liability coverage with **(1)** an each-accident limit of not less than $1,000,000, **(2)** a disease each-employee limit of not less than $1,000,000, and **(3)** a disease policy limit of not less than $1,000,000.

10.3.3 Commercial General Liability. The Contractor shall maintain commercial general liability ("CGL") coverage that provides **(1)** an each-occurrence limit of not less than $1,000,000, **(2)** a general-aggregate limit of not less than $2,000,000, and **(3)** a products and completed-operations aggregate limit of not less than $2,000,000.

10.3.3.1 The CGL insurance shall be written on ISO occurrence form CG 00 01 04 13 or a substitute form, providing at least equivalent coverage for liability arising from premises, operations, independent contractors, products/completed-operations, personal and advertising injury, and liability assumed under an insured contract.

10.3.3.2 The Contractor shall include the State, Contracting Authority, Owner, and A/E as additional insureds under the CGL policy using ISO endorsement CG 20 10 07 04 and ISO endorsement CG 20 37 07 04 or a substitute form(s) providing equivalent coverage.

10.3.3.3 The CGL policy shall be endorsed using ISO endorsement CG 25 03 or a substitute form providing equivalent coverage to provide that the general aggregate limit applies separately to each of the insured's projects.

10.3.3.4 The CGL policy shall not exclude coverage for property damage to the Work arising out of the products/completed-operations hazard where a Subcontractor performed the damaged Work or the Work out of which the damage arises.

10.3.3.5 The CGL insurance shall not exclude coverage for property damage to electronic data.

10.3.3.6 The CGL insurance shall apply as primary and non-contributory insurance with respect to any other insurance or self-insurance programs that cover the additional insured(s).

10.3.3.7 The CGL policy shall not exclude coverage to the additional insured(s) for bodily injury or property damage arising out of the products/completed-operations hazard.

10.3.3.8 The Contractor shall maintain the CGL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.4 Business Automobile Liability. The Contractor shall maintain business automobile ("BA") coverage written on ISO form CA 00 01 04 13 or a substitute form, providing at least equivalent coverage with a limit of not less than $1,000,000 each accident.

10.3.4.1 The coverage shall extend to any auto (owned, not owned, leased, rented, hired, or borrowed).

10.3.4.2 The Contractor shall include the State, Contracting Authority, Owner, and A/E as additional insureds under the BA policy.

10.3.4.3 The BA policy shall include an MCS-90 endorsement if transporting hazardous wastes/materials.

10.3.5 Umbrella/Excess Liability. The Contractor may employ an umbrella/excess liability policy to achieve the above-required minimum coverage.

10.3.5.1 The Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $2,000,000 (in addition to the above-required limits) if the Work (or the Work to be performed by the Subcontractor) includes any of the following:

.1 brick/block masonry;
.2 exterior caulking/sealant;
.3 cast-in-place or precast concrete;
.4 curtain wall;
.5 dampproofing/waterproofing;
.6 electrical;
.7 elevator;
.8 exterior glass and/or glazing;
.9 exterior marble, granite, and/or other stonework;
.10 miscellaneous metals;
.11 plaster/stucco;
.12 plumbing;
.13 HVAC;
.14 roofing and/or sheet metal;
.15 scaffolding;
.16 spray-on fireproofing;
.17 sprinkler and/or fire protection; or
.18 structural steel and/or metal deck.

10.3.5.2 The Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $5,000,000 (in addition to the above-required limits) if the Work (or the Work to performed by the Subcontractor) includes any of the following:

.1 caissons and/or piles;
.2 demolition;
.3 excavation and/or utility work;
.4 sheeting, shoring, and/or underpinning;
.5 window washing equipment; or
.6 wrecking.

10.3.6 Contractor's Pollution Liability. If the Work includes environmentally sensitive, hazardous types of activities (such as demolition, exterior insulation finish systems, Asbestos abatement, storage-tank removal, or similar activities), or involves Hazardous Materials, the Contractor shall maintain a contractor's pollution liability ("CPL") policy with **(1)** a per-claim limit of not less than $1,000,000 and **(2)** an annual-aggregate limit of not less than $1,000,000, covering the acts, errors and/or omissions of the Contractor for damages (including from mold) sustained by the Owner by reason of the Contractor's performance of the Work.

10.3.6.1 The CPL policy shall have an effective date, which is on or before the date that the Contractor first started to perform any Project-related services.

10.3.6.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the CPL policy's limits.

10.3.6.3 The Contractor shall maintain the CPL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.7 Professional Liability—Contractor. The Contractor shall maintain contractor's professional liability ("PL") insurance (including without limitation for sprinkler and/or fire protection and other design-build work included in the Work, and services related to coordination and scheduling of construction activities, and means and methods) without design-build exclusions with limits not less than as identified in the following table:

Contract Sum	Each Claim	Annual Aggregate
Up to $50,000,000	$1,000,000	$2,000,000
More than $50,000,000	$2,000,000	$4,000,000

10.3.7.1 The PL policy shall have an effective date on or before the date that the Contractor first started to provide any Project-related services.

10.3.7.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the PL policy's limits.

10.3.7.3 The Contractor shall maintain the PL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.7.4 If the Contractor is authorized under Applicable Law to directly provide professional design services, the Contractor may satisfy the requirements of this **Section 10.3.7** by providing a professional liability insurance policy.

10.3.7.5 If the Contractor is a joint venture:

.1 the Contractor may meet the requirements of this **Section 10.3.7** by providing a PL policy under which each joint venturer is the insured; or

.2 each joint venturer shall individually meet the requirements of this **Section 10.3.7** by providing a PL policy **(1)** under which the individual joint venturer is the insured and **(2)** that covers that joint venturer's interests in the joint venture by endorsement or otherwise. The certificate of insurance shall reflect that the PL policy covers the joint venturer's interest in the joint venture.

Example: Assume that the Contractor **(1)** is the "XY joint venture" of company "X" and company "Y"; and **(2)** is required under **Section 10.3.7** to maintain PL insurance limits of $1M/$2M. In order to comply with **Section 10.3.7.5.2**, "X" must maintain PL insurance limits of $1M/$2M and "Y" must maintain PL insurance limits of $1M/$2M.

10.3.7.6 If the Contractor is a limited-liability company, which members consist of two or more separate firms:

.1 the Contractor may meet the requirements of this **Section 10.3.7** by providing a PL policy under which the limited-liability company is the insured; or

.2 each member of the limited-liability company shall individually meet the requirements of this **Section 10.3.7** by providing a PL policy **(1)** under which the individual member is the insured and **(2)** that covers that member's interests in the limited-liability company by endorsement or otherwise. The certificate of insurance shall reflect that the PL policy covers the member's interest in the limited-liability company.

Example: Assume that the Contractor **(1)** is the "XY limited-liability company," the members of which are "X" and "Y"; and **(2)** is required under **Section 10.3.7** to maintain PL insurance limits of $1M/$2M. In order to comply with **Section 10.3.7.6.2**, "X" must maintain PL insurance limits of $1M/$2M and "Y" must maintain PL insurance limits of $1M/$2M.

10.3.8 Professional Liability—Subcontractors. If the Work to be performed by a Subcontractor includes any professional design services (including without limitation sprinkler and/or fire protection and other design-build work) the Subcontractor shall maintain contractor's PL insurance without design-build exclusions with limits not less than as identified in the following table:

Subcontract Sum	Each Claim	Annual Aggregate
Up to $50,000,000	$1,000,000	$2,000,000
More than $50,000,000	$2,000,000	$4,000,000

10.3.8.1 The PL policy shall have an effective date on or before the date that the Subcontractor first started to provide any Project-related services.

10.3.8.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the Subcontractor's PL policy's limits.

10.3.8.3 The Subcontractor shall maintain the PL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.8.4 If the Subcontractor is authorized under Applicable Law to directly provide professional design services, the Subcontractor may satisfy the requirements of this **Section 10.3.7.5** by providing a professional liability insurance policy.

10.3.9 Aviation Liability. If the Contractor or a Subcontractor uses manned or unmanned aircraft, including helicopters, in performance of the Work, the Contractor shall maintain aircraft or aviation liability coverage in an amount of no less than $10,000,000. The Contracting Authority and Owner will not be liable for any damage to any aircraft owned, leased, rented, or borrowed by the Contractor or a Subcontractor.

10.3.10 Watercraft Liability. If the Contractor or a Subcontractor uses watercraft in performance of the Work, the Contractor shall maintain watercraft liability coverage including protection and indemnity insurance in an amount of no less than $5,000,000. The Contracting Authority and Owner will not be liable for any damage to any watercraft owned, leased, rented, or borrowed by the Contractor or Subcontractor.

10.3.11 Equipment Coverage. The Contracting Authority and Owner will not insure or be liable for damage to any Contractor or Subcontractor owned, leased, rented, or borrowed tools, equipment, or vehicles. The Contractor and Subcontractors are solely responsible for maintaining all insurance necessary to cover their tools, equipment, and vehicles.

10.3.12 Ocean Marine Insurance. If the shipment of equipment or materials for the Work will not be covered by the builder's risk insurance described under **Section 10.4**, the Contractor shall maintain ocean marine insurance to the Site including cost, insurance, and freight with limits of not less than an amount equal to the full replacement cost of equipment/materials shipped to final destination point. The insurance shall include the following minimum requirements:

10.3.12.1 all-risk basis including war risk and all forms of terrorism;

10.3.12.2 coverage for general average and salvage charges;

10.3.12.3 "on deck" coverage;

10.3.12.4 warehouse-to-warehouse coverage;

10.3.12.5 coverage to include losses from strikes, riots, and civil commotions ("SR&CC coverage");

10.3.12.6 coverage to include losses from free of capture and seizure warranty ("FC&S Warranty coverage");

10.3.12.7 "Inchmaree" clause;

10.3.12.8 sue and labor;

10.3.12.9 "both-to-blame" coverage;

10.3.12.10 free of particular average;

10.3.12.11 inland coverage including on-land shipment, port storage, and barge transit upon inland waterways; and

10.3.12.12 damage by saltwater and rainwater perils and cargo sweat.

10.3.13 Additional Property Insurance. For any demolition, blasting, excavating, tunneling, shoring, or similar operations, the Contractor shall provide and maintain Property Damage Liability insurance with a limit of liability equal to the limit as specified in the applicable sections of **Article 10**.

10.4 Builder's Risk Insurance

10.4.1 The Contractor shall maintain a builder's risk insurance policy written on a special causes of loss form and an open-perils basis providing coverage for direct physical loss of or damage to covered property arising from insured perils that shall not exclude: theft; fire; vandalism; malicious mischief; earthquake; earth movement; tornado; lightning; explosion; breakage of glass; flood; windstorm; collapse; water damage; hot and cold testing; debris removal and/or demolition occasioned by enforcement of Applicable Law; sudden and accidental equipment breakdown; and resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials.

10.4.1.1 The policy shall cover the Project in the course of construction including false-work, temporary buildings and structures, and materials used in the construction process, stored on or off-site, or while in transit.

10.4.1.2 The coverage shall be written on a replacement-cost basis in an amount equal to not less than the initial Contract Sum, plus the value of: **(1)** all subsequent GMP Amendments and Modifications; **(2)** materials supplied and installed by others; and **(3)** any furnishings, fixtures, materials, or equipment located at the Site. All sub-limits of coverage are subject to the prior written approval of the Contracting Authority and Owner.

10.4.1.3 The policy shall not include any deductible of more than $25,000 per occurrence. Any deductible over that amount is subject to the prior written approval of the Contracting Authority and Owner.

10.4.1.4 The named insureds under the policy shall include the State, Contracting Authority, Owner, Contractor, Subcontractors at all tiers, and Separate Contractors.

10.4.1.5 Coverage shall include the reasonable extra costs of acceleration and expediting temporary and permanent repairs to, or permanent replacement of, damaged property. Those covered costs shall include overtime wages and the extra cost of "express" or other means for rapidly transporting materials and supplies necessary to the repair or replacement.

10.4.1.6 Coverage shall include a "soft cost endorsement" including, but not limited to, the reasonable extra costs of the A/E and reasonable Contractor extension or acceleration costs.

10.4.1.7 Coverage shall waive all rights between the Owner, Contracting Authority, Contractor, and Subcontractors at any tier, for damages caused by fire or any other perils to the extent of actual recovery of any insurance proceeds under the policy.

10.4.1.8 Coverage shall include provisions for mechanical or electrical breakdown, or boiler system testing if a boiler system is part of the Work.

10.4.1.9 Coverage shall include temporary structures and scaffolding, along with collapse coverage.

10.4.1.10 Coverage shall be primary to all other applicable insurance.

10.4.1.11 The policy shall specifically permit and allow for Partial Occupancy as defined under the Contract Documents and for partial occupancy or a similar term as used under the policy.

10.4.1.12 The Contractor shall maintain the policy in effect until Substantial Completion of all Work. The Contractor shall provide written notice to the Contracting Authority no less than 30 days before the expiration or termination of the policy.

10.4.1.13 The Contractor's tools and equipment shall not be covered under the builder's risk policy. It is the Contractor's sole responsibility to maintain such coverage, the cost of which shall be included in its Overhead (a component of Contractor's Fee) and not included as a separate item in the Contractor's Schedule of Values.

10.4.2 If the Contractor is involved solely in the installation of material and equipment and not in new building construction, the Contractor shall purchase and maintain a builder's risk, builder's risk-renovations, or installation floater insurance policy. The policy shall comply with the provisions of **Section 10.4.1.**

10.4.3 No less than ten days before the Contractor starts to perform any Work on the Site, the Contractor shall provide to the Contracting Authority an insurance-company certified copy of the complete insurance policy required under **Section 10.4.1** or **10.4.2** as applicable. The Contracting Authority's receipt of that copy of the policy is a condition precedent to the Contractor's entitlement to payment of any portion of the Contract Sum.

10.5 Waivers of Subrogation

10.5.1 To the fullest extent permitted by Applicable Law, the Contractor waives all rights against the Owner, Contracting Authority, and their agents and employees for damages to the extent covered by any insurance, except rights to the proceeds of that insurance. All policies shall accomplish the waiver of subrogation by endorsement or otherwise.

10.5.2 The Owner, Contracting Authority, and Contractor waive all rights against each other for damages caused by fire or other perils to the extent of actual recovery of any insurance proceeds under any property insurance, inland marine insurance, or builder's risk insurance applicable to the Work.

10.6 Indemnification for Injury or Damage

10.6.1 To the fullest extent permitted by Applicable Law, the Contractor shall indemnify, defend, and hold harmless the Indemnified Parties from and against all claims, costs, damages, losses, fines, penalties, and expenses (including but not limited to all fees and charges of attorneys and other professionals, and all court, arbitration, or other dispute-resolution costs) arising out of or in connection with the Project, provided that any such claim, cost, damage, loss, fine, penalty, or expense is attributable to:

10.6.1.1 bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property but only to the extent caused by the negligent acts, errors, or omissions of the Contractor or a person or entity for whom the Contractor may be liable;

10.6.1.2 infringement of patent rights or copyrights by the Contractor or a person or entity for whom the Contractor may be liable; or

10.6.1.3 a violation of Applicable Law but only to the extent attributable to the Contractor or a person or entity for whom the Contractor may be liable.

10.6.2 The Contractor's indemnification obligation under **Section 10.6** exists regardless of whether or not and the extent to which the claim, damage, loss, fine, penalty, or expense is caused in part by a party indemnified under **Section 10.6**. But nothing in **Section 10.6** obligates the Contractor to indemnify any individual or entity from and against the consequences of that individual or entity's own negligence.

10.6.3 The Contractor's obligations under **Section 10.6** shall not extend to the liability of the A/E, A/E's consultants, agents, representatives, or employees for negligent preparation or approval of Drawings, Specifications, Change Orders, opinions, and any other responsibility of the A/E, except to the extent covered by the Contractor's insurance.

10.6.4 In claims against an Indemnified Party by any direct or indirect employee (or the survivor or personal representative of that employee) of the Contractor or a person or entity for whom the Contractor may be liable, the indemnification obligation under **Section 10.6** will not be limited by a limitation on the amount or type of damages, compensation, or benefits payable under workers' compensation acts, disability benefit acts, or other employee benefit acts.

10.6.5 The Contractor's indemnification obligation under **Section 10.6** will not be limited by any insurance policy provided or required in connection with the Project.

10.6.6 The Contractor's obligations under **Section 10.6** shall not negate, abridge, or reduce other rights or obligations of indemnity, which would otherwise exist as to an Indemnified Party.

10.6.7 The Contractor's indemnification obligation under **Section 10.6** will survive termination of the Contract and Contract Completion.

10.6.8 The Contracting Authority may deduct from the Contract Sum the claims, damages, losses, fines, penalties, and expenses for which the Contractor is liable under **Section 10.6**. If those claims, damages, losses, fines, penalties, and expenses exceed the unpaid balance of the Contract Sum, the Contractor shall immediately pay the difference to the Owner.

ARTICLE 11 - SUSPENSION AND TERMINATION

11.1 Suspension of the Work

11.1.1 The Contracting Authority, without cause and without prejudice to any other right or remedy it may have, may order the Contractor in writing to suspend, delay, or interrupt performance of the Work in whole or in part for such period as the Contracting Authority may determine.

11.1.1.1 If the Contracting Authority suspends the Work under this **Section 11.1.1** and the Contractor complies with **Article 8**, the Contract Sum and Contract Times shall be adjusted for increases in the cost and time caused by the suspension, delay, or interruption. The adjustment of the Contract Sum, however, shall not include profit (a component of Contractor's Fee).

11.1.1.2 Notwithstanding the foregoing, no adjustment shall be made to the Contract Sum or Contract Times to the extent that:

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

11.1.1.3 If the Contracting Authority suspends the Work under this **Section 11.1.1** and the Contractor submits a proper Contractor Payment Request, subject to all other provisions of the Contract Documents, the Contractor shall be entitled to payment of compensation due under the Contract Documents for Work performed before the suspension based upon the Schedule of Values.

11.1.2 The Contracting Authority, without prejudice to any other right or remedy it may have, may order the Contractor in writing to suspend, delay, or interrupt the performance of the Work in whole or in part for such period as the Contracting Authority may determine for any of the following reasons: **(1)** Defective Work; **(2)** the Contractor is causing undue risk of damage to any part of the Project or adjacent area; **(3)** the Contractor fails to furnish or perform the Work in such a way that the complete Work will conform to the requirements of the Contract Documents; or **(4)** any other cause the Contracting Authority reasonably believes justifies suspension.

11.1.2.1 The Contracting Authority's exercise of its right to suspend the Work under this **Section 11.1.2** shall not entitle the Contractor to any adjustment of the Contract Sum, Contract Times, or both.

11.1.2.2 If the Contracting Authority is adjudged to have improperly or unjustifiably suspended the Work under this **Section 11.1.2**, the suspension shall be deemed to have been a suspension under **Section 11.1.1**.

11.1.3 Upon receipt of notice of suspension under this **Section 11.1**, the Contractor shall cease Work on the suspended activities and take all necessary or appropriate steps to limit disbursements and minimize respective costs. The Contractor shall furnish a report to the Contracting Authority, within five days after receiving the notice of suspension, describing the status of the Work, including, but not limited to, results accomplished, resulting conclusions, and other information as the Contracting Authority may require.

11.1.4 The Contracting Authority's right to stop the Work shall not give rise to any duty to exercise the right for the benefit of the Contractor or any other party, and the Contracting Authority's exercise or failure to exercise the right shall not prejudice any of the Contracting Authority's other rights.

11.2 Termination for Convenience

11.2.1 The Contracting Authority may at any time terminate the Contract in whole or in part for the Owner's convenience and without cause, upon ten days' written notice to the Contractor.

11.2.2 Upon receipt of the notice of termination for convenience, the Contractor shall immediately proceed with performance of the following duties in accordance with instructions from the Contracting Authority:

11.2.2.1 cease operation as specified in the notice;

11.2.2.2 place no further orders and enter into no further subcontracts for materials, labor, services, or facilities, except as necessary to complete continued portions of the Project;

11.2.2.3 terminate all subcontracts and orders to the extent they relate to the Work terminated;

11.2.2.4 proceed with Work not terminated; and

11.2.2.5 take actions that may be necessary, or that the Contracting Authority may direct, for the protection and preservation of the terminated Work.

11.2.3 Upon termination, the Contracting Authority shall pay the Contractor in accordance with the Schedule of Values for Work completed, including any retained funds, and the value of materials ordered and delivered, less any salvage credit the Contractor may receive for them.

11.2.3.1 All materials, equipment, facilities, and supplies at the Site or stored off-site, for which the Contractor has received payment, shall become the property of the Owner.

11.2.3.2 The Contractor is entitled to a fair and reasonable profit for Work performed and reasonable expenses directly attributable to termination of the Contract. In no event shall the Contractor be entitled to **(1)** Contractor's Fee on Work not performed or **(2)** compensation in excess of the total Contract Sum.

11.2.4 If the Contracting Authority terminates the Work under this **Section 11.2**, the termination shall not affect the rights or remedies of the State against the Contractor then existing or which may thereafter accrue.

11.2.5 Notwithstanding **Section 11.2.3**, if the Contracting Authority terminates the Work under this **Section 11.2**, but there exists an event of the Contractor's default, the Contractor shall be entitled to receive only such amounts as it would be entitled to receive following the occurrence of an event of default as provided in **Section 11.3**.

11.3 Termination for Cause

11.3.1 The Contracting Authority may terminate the Contract in whole or in part if the Contractor commits a material breach of the Contract including but not limited to:

11.3.1.1 failure to prosecute the Work with the necessary force or in a timely manner;

11.3.1.2 refusal to remedy Defective Work;

11.3.1.3 failure to supply enough properly skilled workers or proper materials;

11.3.1.4 failure to properly make payment to Subcontractors or Consultants;

11.3.1.5 performance of any services outside of the United States;

11.3.1.6 permitting its Subcontractors or Consultants to perform any services outside of the United States; or

11.3.1.7 disregarding laws, ordinances, or rules, regulations, or orders of a public authority with jurisdiction over the Project.

11.3.2 If the Contracting Authority intends to exercise its termination rights under this **Section 11.3**, the Contracting Authority shall issue not less than five days' written notice to the Contractor and the Contractor's Surety in accordance with ORC Section 153.17 ("Five-Day Notice").

11.3.2.1 Notwithstanding any provision of the Contract to the contrary **(1)** the issuance of a 72-Hour Notice under **Section 6.23.1** is not a condition precedent to the Contracting Authority's exercise of its rights under **Section 11.3** and **(2)** the Contracting Authority's decision to not issue a 72-Hour Notice under **Section 6.23.1** will not prejudice the Contracting Authority's rights under **Section 11.3**.

11.3.3 If the Contractor fails to satisfy the requirements set forth in the Five-Day Notice within 15 days after receipt of the Five-Day Notice, the Contracting Authority may declare the Contractor in default, terminate the Contract, and employ upon the Work the additional force or supply materials or either as appropriate, and remove Defective Work.

11.3.4 If the Contract is terminated, the Contractor's Surety may perform the Contract. If the Contractor's Surety does not commence performance of the Contract within ten days after the date of Contract termination, the Contracting Authority may complete the Work by any means the Contracting Authority determines appropriate. The Contracting Authority may take possession of and use all materials, facilities, and equipment at the Site or stored off-site, for which the State has paid.

11.3.5 If the Contract is terminated, the Contractor shall not be entitled to further payment. If the unpaid balance of the Contract Sum exceeds the costs of finishing the Work, including without limitation the fees and charges of engineers, architects, attorneys, and other professionals and court costs, and other damages incurred by the Owner and not expressly waived, the Contractor or Surety shall immediately pay the amount of the insufficiency to the Owner. This obligation for payment shall survive termination of the Contract.

11.3.6 If the Contractor's Surety performs the Work, the provisions of the Contract Documents govern the Surety's performance, with the Surety in place of the Contractor in all provisions including, but not limited to, provisions for payment for the Work, and provisions of the right of the Contracting Authority to complete the Work.

11.3.7 If the Contracting Authority terminates the Contract under this **Section 11.3**, the termination shall not affect any rights or remedies of the State against the Contractor then existing or which may thereafter accrue. The Contracting Authority's retention or payment of funds due the Contractor shall not release the Contractor or the Contractor's Surety from liability for performance of the Work in accordance with the requirements of the Contract Documents.

11.3.8 If the Contracting Authority is adjudged to have improperly or unjustifiably terminated the Contract under this **Section 11.3**, the termination will be deemed to have been a termination under **Section 11.2**.

11.4 Contractor Insolvency

11.4.1 The Contracting Authority may immediately terminate the Contract for cause if:

11.4.1.1 the Contractor commences a voluntary case under Title 11 of the United States Code or the corresponding provisions of any successor laws; or

11.4.1.2 any legal entity commences an involuntary case against the Contractor under Title 11 of the United States Code or the corresponding provisions of any successor laws and **(1)** the case is not dismissed within 60 days after its commencement; or **(2)** the court before which the case is pending issues an order for relief or similar order approving the case; or

11.4.1.3 a court of competent jurisdiction appoints, or the Contractor makes an assignment of all or substantially all of its assets to, a receiver, trustee, liquidator, or other similar custodian for the Contractor or all or substantially all of the Contractor's assets; or

11.4.1.4 any attachment, execution, or other judicial seizure is levied against all or substantially all of the Contractor's assets; or

11.4.1.5 the Contractor takes any action toward the dissolution or winding up of its business; or

11.4.1.6 the Contractor fails generally to pay its debts as they become due (unless those debts are subject to a good-faith dispute as to liability or amount) or it acknowledges in writing that it is unable to do so.

11.4.2 If the Contractor files a voluntary petition in bankruptcy or has an involuntary petition in bankruptcy filed against it, the Contractor, the Contractor as the debtor-in-possession, or the trustee of the Contractor's bankruptcy estate shall file a motion to assume or reject the Contract under Bankruptcy Code §365, 11 U.S.C. §365, within 20 days after the filing of the voluntary petition or involuntary petition and shall diligently prosecute that motion to conclusion so as to obtain an order granting or denying that motion within 45 days after the filing of the voluntary or involuntary petition.

11.4.3 If the Contracting Authority intends to exercise its termination rights under this **Section 11.4**, the Contracting Authority shall notify the Contractor in writing of the Contracting Authority's termination of the Contract and the cause(s) for that termination.

11.4.4 The Contractor agrees to the granting of relief from the automatic stay of the Bankruptcy Code, 11 U.S.C. §362(a), to permit the Contracting Authority to terminate the Contract for cause in such instance and issue and serve all notices necessary to terminate the Contract or arising out of the termination of the Contract and to take any and all other action necessary to terminate the Contract.

ARTICLE 12 - GENERAL PROVISIONS

12.1 Contractor's Documents and Contract Documents

12.1.1 Ownership.

12.1.1.1 The Owner alone owns the Contractor's Documents and the Contract Documents and every right, title, and interest therein.

.1 The Contractor must execute and deliver and cause its employees and agents and all Subcontractors and Consultants to execute and deliver, to the Owner any transfers, assignments, documents, or other instruments (if any) necessary to vest in the Owner complete right, title, interest in and ownership of the Contractor's Documents and the Contract Documents.

12.1.1.2 The Contractor may retain copies, including reproducible copies, of the Contractor's Documents and the Contract Documents for information, reference, and performance of the Work.

12.1.1.3 The submission or distribution of the Contractor's Documents or the Contract Documents to meet official regulatory requirements or for similar purposes in connection with the Project is not a waiver of the Owner's reserved rights in the Contractor's Documents and the Contract Documents. Any unauthorized use of the Contractor's Documents or the Contract Documents shall be at the sole risk of the entity making the unauthorized use.

12.1.1.4 The Contractor shall provide Electronic Files (in native format) to Separate Consultants and Separate Contractors for their use in connection with the Project. The Contractor shall provide the Electronic Files **(1)** at no additional cost to the Separate Consultants, Separate Contractors, and Owner and **(2)** without requiring the Separate Consultants, Separate Contractors, or Owner to agree to any terms or conditions concerning the provision, receipt, or use of the Electronic Files that differ in any material respect from the Contract.

12.1.2 Intent.

12.1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor.

12.1.2.2 The Contract Documents are complementary, and what is required by one is binding as if required by all.

12.1.2.3 The Contractor shall provide all labor and materials necessary for the entire completion of the Work described in the Contract Documents and reasonably inferable to produce the intended results.

12.1.2.4 The Drawings govern dimensions, details, and locations of the Work. The Specifications govern quality of materials and workmanship.

12.1.2.5 The organization of the Specifications in divisions, sections, and articles, and the arrangement of Drawings shall not restrict the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

12.1.2.6 In the event of inconsistency or conflict within the Contract Documents, the Contractor shall provide the better quality or greater quantity of Work, and comply with the stricter requirement.

12.1.2.7 Unless otherwise defined in the Contract Documents, words that have well-known technical or construction industry meanings are used in accordance with those recognized meanings.

12.1.2.8 The Sections of Division 01 - "General Requirements" govern the performance of the Work of all Sections of the Specifications.

12.1.3 Use of Electronic Files.

12.1.3.1 The Owner, Contracting Authority, A/E, and Contractor reasonably expect that they will provide Electronic Files to each other to facilitate the design and construction of the Project consistent with current practices and customs in the construction industry.

12.1.3.2 The Owner, Contracting Authority, A/E, and Contractor acknowledge that the use of Electronic Files involves risks not generally associated with the use of paper documents. Those risks include, for example and

without limitation, alteration (inadvertent or intentional) and deterioration, both of which may not be readily apparent through casual observation.

12.1.3.3 The Owner, Contracting Authority, A/E, and Contractor do not warrant to each other that any Electronic File they provide **(1)** was not altered though transmission; **(2)** is compatible with the recipient's computer system or software; **(3)** will not be altered through degradation of the recipient's storage media; or **(4)** is suitable for conversion/translation to and subsequent use in a system or format other than the Electronic File's original system or format.

12.1.3.4 Before relying on any Electronic File it receives, the recipient is responsible for verifying that the Electronic File was not altered though transmission, degradation of the recipient's own storage media, or other causes.

12.1.3.5 If the recipient of an Electronic File converts/translates the Electronic File from its original system or format to an alternate system or format, the recipient assumes the risk that the conversion/translation created errors in the converted/translated file.

12.1.3.6 The Owner, Contracting Authority, A/E, and Contractor shall each maintain and operate its own computer systems and storage media in a commercially reasonable way and take reasonable steps to prevent errors in and deterioration of the Electronic Files it creates, provides, and receives.

12.1.3.7 In the event of a discrepancy between information contained in a paper version of a document and the Electronic File of that document, the paper version will govern.

12.1.3.8 This **Section 12.1.3** does not relieve the Contractor of its responsibility for the preparation, completeness, or accuracy of the Contractor's Documents.

12.2 Public Relations

12.2.1 Publicity prior to completion of the Project. Prior to completion of the Project, public relations or publicity about the Project shall be solely within the control, and with the consent of, the Owner.

12.2.2 Publicity after completion of the Project. After completion of the Project, the Contractor may exercise reasonable public relations and marketing efforts related to the Project, provided the Contractor properly identifies the Owner and Contracting Authority, and their participation in the Project.

12.2.3 Professional Photography. If the Contractor commissions photography of the completed Project, the Contractor shall include in its photography agreements a release for unrestricted and unlimited use of photographs by the Owner and Contracting Authority, and shall provide the Owner and Contracting Authority with a reasonable quantity of photographs for use in the Owner's and the Contracting Authority's marketing and awareness activities, including, but not limited to, profiles of the Project on their respective websites.

12.2.4 Craft Awards and Other Recognition. If the Contractor submits the Project for craft awards or other similar venues for recognition of the Project, the Contractor shall properly identify the Owner and Contracting Authority, and their participation in the Project. In addition, if the Project receives any craft award or other recognition, the Contractor shall provide duplicate copies of the award plaque or other memento of the award to the Owner and Contracting Authority.

12.3 Application and Governing Law

12.3.1 The Contract and the rights of the parties thereunder shall be governed by the laws of the state of Ohio and only Ohio courts shall have jurisdiction over any action or proceeding concerning the Contract and/or performance thereunder. The Contractor irrevocably consents to such jurisdiction.

12.3.2 The parties to the Contract shall comply with Applicable Law.

12.3.3 Other rights and responsibilities of the Contractor, A/E, Contracting Authority, and Owner are set forth throughout the Contract Documents and included under different titles, articles, and paragraphs for convenience.

12.4 Conditions of the Contract

12.4.1 These General Conditions govern, take precedence over, and shall not be superseded or amended by Drawings and Specifications, unless so provided in Supplementary Conditions prepared by the Contracting Authority and approved by the Ohio Facilities Construction Commission.

12.5 Notice of Commencement.

12.5.1 The Contracting Authority shall prepare a Notice of Commencement and make it available as required under ORC Section 1311.252.

12.5.2 Upon request, the Contracting Authority or the Contractor shall furnish the Notice of Commencement to Subcontractors or any other member of the public.

12.6 Written Notice

12.6.1 Notice under the Contract Documents shall be validly given if:

12.6.1.1 delivered personally to a member of the organization for whom the notice is intended;

12.6.1.2 delivered by trackable delivery service, or sent by registered or certified mail, to the last known business address of the organization; or

12.6.1.3 sent by facsimile, email, or web-based project management software, provided the original, signed document is delivered within three business days after the date of the electronic transmission.

12.6.2 When the Owner, Contracting Authority, A/E, or Contractor gives notice to one of the other three, it shall also simultaneously send a copy of that notice to the others.

12.6.3 A copy of all notices, certificates, requests, or other communications to the Contracting Authority shall be sent to the Project Manager.

12.6.4 In the event of an emergency involving the Project, including, but not limited to, a fatality, serious injury, fire, collapse, flood, utility, or power loss to occupied facilities, explosion, or environmental damage, the Contractor shall immediately notify the A/E, Contracting Authority, and Owner by the most expedient means available.

12.6.5 The Contracting Authority, Owner, A/E, or Contractor may, by written notice given hereunder, designate addresses, telephone numbers, email addresses, or facsimile numbers to which notices, certificates, requests, or communications shall be sent.

12.7 Taxes

12.7.1 Only those materials that ultimately become a part of the completed structure or improvement that constitutes the Project shall be exempt from state sales tax and state use tax.

12.7.2 The purchase, lease, or rental of material, equipment, parts, or expendable items as concrete form lumber, tools, oils, greases, and fuels, which are used in connection with the Work, are subject to the application of state sales tax and state use tax.

12.8 Computing Time

12.8.1 When the Contract Documents refer to a period of time by a number of days, the period shall be computed to exclude the first and include the last day of the period. If the last day of the period falls on a Saturday, Sunday, or a legal holiday, that day shall be omitted from the computation and the period shall end on the next succeeding day that is not a Saturday, Sunday, or legal holiday.

12.8.2 Except as excluded under **Section 12.8.1**, the Contract Times and all other periods referred to in the Contract Documents includes Saturdays, Sundays, and all days defined as legal holidays by **Section 12.8.4**.

12.8.3 The standard workdays for State projects are Monday through Friday, excluding legal holidays.

12.8.4 Legal holidays are as follows:

12.8.4.1 New Year's Day – First Day in January;

12.8.4.2 Martin Luther King Jr. Day – Third Monday in January;

12.8.4.3 Washington-Lincoln (President's) Day – Third Monday in February;

12.8.4.4 Memorial Day – Last Monday in May;

12.8.4.5 Juneteenth Day – Nineteenth Day of June;

12.8.4.6 Independence Day – Fourth day of July;

12.8.4.7 Labor Day – First Monday in September;

12.8.4.8 Columbus Day – Second Monday in October;

12.8.4.9 Veterans' Day – Eleventh Day of November;

12.8.4.10 Thanksgiving Day – Fourth Thursday of November; and

12.8.4.11 Christmas Day – Twenty-fifth day of December.

12.8.5 If a legal holiday falls on a Saturday, it is observed on the preceding Friday. If a legal holiday falls on a Sunday, it is observed on the following Monday.

12.9 Time of the Essence

12.9.1 Time limits stated in the Contract Documents are of the essence of the Contract and all obligations under the Contract. By signing the Agreement, the Contractor acknowledges that the Contract Times are reasonable, taking into consideration the usual weather and other conditions prevailing in the locality of the Project. By signing the Construction Schedule, the Contractor acknowledges that the specified Milestone dates are reasonable, taking into consideration the usual weather and other conditions prevailing in the locality of the Project.

12.9.1.1 The Notice to Proceed establishes the date for commencement of the Work.

12.9.1.2 The Contractor acknowledges that the Owner has entered into, or may enter into, agreements for use of all or part of the premises where the Work is to be completed based upon the Contractor achieving Contract Completion within the associated Contract Time.

12.9.1.3 The Contractor shall perform the Work in a reasonable, efficient, and economical sequence, and in the order and time as provided in the Construction Progress Schedule.

12.9.1.4 The Contractor acknowledges that it may be subject to interference, disruption, hindrance, or delay in the progress of the Work from any cause.

12.10 Successors and Assigns

12.10.1 The Contracting Authority and Contractor each bind themselves, their successors, assigns, and legal representatives, to the other party to this Contract and to the successors, assigns, and legal representatives of the other party with respect to all terms of this Contract.

12.10.2 The Contracting Authority and Contractor each acknowledge that the Owner is an intended third-party beneficiary of this Contract.

12.10.3 The Contractor shall not assign or transfer any right, title, or interest in this Contract without the Contracting Authority's prior written consent.

12.11 Extent of Contract

12.11.1 Entire Contract. Contract Documents represent the entire and integrated agreement between the Contracting Authority and Contractor and supersede all prior negotiations, representations, or agreements, either written or oral.

12.11.2 Multiple Counterparts. This Contract may be executed in any number of counterparts, each of which shall be regarded as an original and all of which shall constitute but one and the same instrument.

12.11.3 Captions. The captions and headings in this Contract are for convenience only and in no way define, limit, or describe the scope or intent of any provisions or sections hereof.

12.11.4 Precedence. If there are any inconsistencies between the provisions of the Contract Documents and the provisions of the Contract, the provisions of this Contract shall prevail.

12.12 Severability

12.12.1 If any term or provision of this Contract or the application thereof to any Person or circumstance, is finally determined to be invalid or unenforceable by a court of competent jurisdiction, the remainder of this Contract or the application of such term or provision to other Persons or circumstances, shall not be affected thereby, and each term and provision of this Contract shall be valid and enforced to the fullest extent permitted by Applicable Law.

12.13 Electronic and Facsimile Signatures

12.13.1 Any party hereto may deliver a copy of its counterpart signature page to this Contract via electronic signature software, fax, e-mail, or web-based project management software. Each party hereto shall be entitled to rely upon an electronic, scanned, or facsimile signature of any other party delivered in such a manner as if such signature were an original.

12.14 No Third-Party Interest

12.14.1 Except as expressly provided under **Sections 6.2.3** through **6.2.6** and **Section 12.10.2**, **(1)** no person or entity, other than the Contracting Authority, Owner, and Contractor, will have any right or interest under the Contract, and **(2)** the Contract does not create a contractual relationship of any kind between any people or entities other than the Contracting Authority, Owner, and Contractor.

12.15 Ohio Retirement System

12.15.1 All individuals employed by the Contractor that provide personal services to the Contracting Authority or Owner are not public employees for the purposes of ORC Chapter 145, as amended.

12.15.2 If the Contractor is a PERS retirant, as defined by ORC Section 145.38, the Contractor shall notify the Contracting Authority of such status in writing prior to commencement of Work. The Contracting Authority, Owner, or State is not responsible for changes to the Contractor's retirement benefits resulting from entering into this Contract.

12.16 No Waiver

12.16.1 The failure of the Contracting Authority or Contractor to insist in any one or more instances upon the strict performance of any one or more of the provisions of the Contract or to exercise any rights under the Contract or provided by law will not be construed as a waiver or relinquishment of that provision or right or of the right to subsequently demand strict performance or exercise the right and the rights will continue unchanged and remain in full force and effect.

12.17 Rights and Remedies

12.17.1 The duties, obligations, rights, and remedies under the Contract are in addition to and not a limitation of the duties, obligations, rights, and remedies otherwise imposed by or available under Applicable Law.

12.18 Survival of Obligations

12.18.1 All representations, indemnity obligations, warranties, guarantees, and necessarily continuing obligations under the Contract, will survive final payment, completion and acceptance of the Work, and termination or completion of the Contract.

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END OF DOCUMENT

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions after contract award.

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. Substitution Request Form: Use CSI Form 13.1A.
2. 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 revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed 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.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 21 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. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.

d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.

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. Requested substitution provides sustainable design characteristics that specified product provided.
e. Substitution request is fully documented and properly submitted.
f. Requested substitution will not adversely affect Contractor's construction schedule.
g. Requested substitution has received necessary approvals of authorities having jurisdiction.
h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. 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

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.

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. 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 10 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. Failure to submit a reply within 10 days indicates acceptance of the work with no change in contract cost or time.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Proposal Request Form: AIA Document G709.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 CHANGE ORDER

A. Architect may issue a Change Order on AIA Document G701 for changes in the Work to adjust the Contract Sum or the Contract Time.

1. Owner's approval of a Proposal Request.
2. Owner's and Contractor's agreed upon change to Contract Sum or Contract Time of a Construction Change Directive.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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.

1.3 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 Architect at earliest possible date but no later than ten days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Use AIA Document G702 and AIA Document G703 Continuation Sheets. Alternate forms containing same information as AIA documents are acceptable subject to approval of Architect.

1. Schedule of Values Format: A sample Schedule of values format has been included at the end of this section for reference by the Contractor. This form represents the minimum "Schedule of Values" submittal requirements for the work breakdown of each Contract. Prior to submitting the "Schedule of Values" for approval, the Contractor will be required to refine this list to specifically relate only those items that pertain to the Work of the Contract. Be advised that the Owner, Architect and Construction manager reserve the right to modify existing and/or add additional categories and subcategories during the review and approval process. Labor and/or Material Costs must be completed for each category line item applicable to the Work of the Contract.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Item Number.
b. Related Specification Section or Division.

c. Description of the Work.

1) When the Work occurs in multiple phases or on multiple levels and elevations include separate line items or subcategories for the Description of the Work by Area, Floor or Building Elevation.

d. Dollar value of Labor associate with item.
e. Dollar value of Material associated with item.
f. Dollar value of Schedule Value Total.

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. 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.
4. Provide several line items for Bonds, Insurances, Mobilization, Permits and Fees, Coordination Drawings, Submittals, Supervision, Punch List activities, Attic Stock Materials, Operation and Maintenance manuals, Project Record Documents (As-built drawings), and Demonstration and Training Sessions.
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. Temporary Facilities and Controls: Provide a separate line item in the Schedule of Values for each.
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.
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.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect 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. Detailed submittal requirements will be coordinated with the Owner.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect 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.

D. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

E. Waivers of Mechanic's Lien:

1. Each Prime Contractor shall submit with each Application for Payment a "Conditional Waiver and Release on Progress Payment for use by Prime Contractors" for the value of the current payment value requested.
2. During the course of the Project, the Owner at their discretion, may request final waiver information from subcontractors and suppliers associated with items indicated as complete on the pay application.
3. Waiver Forms: Submit waivers of lien and affidavit's of payment on forms, executed in a manner acceptable to Owner.
4. Refer to Division 00 Section "Lien Waivers" for Owner-required lien waiver instructions and forms to be utilized.

F. 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 and their corresponding work from the Schedule of Values.
2. Schedule of Values.
3. Contractor's Construction Schedule.
4. Submittals Schedule.
5. Copies of building permits including permits relating to MEP work.
6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
7. Certificates of insurance and insurance policies.
8. Performance and payment bonds.
9. Data needed to acquire Owner's insurance.

G. Application for Payment at Substantial Completion: After receipt of 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.

H. 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. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. Release of liens on Owner's required forms. Refer to Division 00 Section "Lien Waivers" for Owner-required lien waiver instructions and forms to be utilized.
6. AIA Document G707, "Consent of Surety to Final Payment", if applicable.
7. Evidence that claims have been settled.
8. Final, liquidated damages settlement statement, if applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

A. See attached example of Contractors Schedule of Values Form.

END OF SECTION

"Schedule of Values (SOV)" Form

CONTRACT ITEMS			SCHEDULE OF VALUES		
Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 1 - GENERAL REQUIREMENTS					
	001000	Construction Contingency			
	001800	Insurances and Bonds			
		General Liability			
		Builder's Risk (if applicable)			
		Bonds (if applicable)			
		Performance / Payment Bonds			
		Landscaping Bonds			
	002000	Pre-Construction Services (if applicable)			
	002010	Direct Personal Expense - Construction Staffing			
	002020	Permits and Fees			
		Building Permit			
		Zoning Permit			
		Soil and Water Erosion Control			
		Sanitary Sewer Tapping Fees			
		Water Service Tapping Fees			
	002040	Direct Expenses			
	005000	CM Fee (if applicable)			
	012100	Allowances			
	013110	Coordination Drawings			
		MEP/T Systems			
		Building Envelope Systems			
	013200	Project Scheduling			
	013533	Infection Control Procedures			
	014000	Quality Requirements			
		Room Pressurization Testing (if not included in Mechanical)			
		Mechanical Test and Balance (if not included in Mechanical)			
	014001	Mock-ups			
		Building Exterior Mock-ups			
		Interior Room Mock-ups			
		Cabinetry Mock-ups			
	015000	Temporary Facilities and Controls			
		Mobile Field Office			
		Safety Railings and Barricades			
		Temporary Security Fencing			
		Storage and Fabrication Sheds			
		Temporary Stairs			
		Temporary Heat & Fuel, Ventilation and Humidity Control			
		Project Sign			
		Traffic Control Signs			
		Temporary Water (if not in Plumbing / Consumption Charges by Owner)			
		Sanitary Facilities (Portable Chemical Toilets)			
		Snow Removal			
		Dumpsters for all Construction Debris			
		Daily Clean-Up			
		Final Clean-up			
		Temporary Power (if not in Electrical / Consumption Charges by Owner)			
		Temporary Lighting (if not in Electrical / Consumption Charges by Owner)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	015329	Interim Life Safety			
	017329	Cutting and Patching (if not included in another trades work scope)			
	017700	Closeout Procedures			
		Punch List Activities			
	017823	Operation and Maintenance Data (Manuals)			
	017839	Project Record Documents (As-Builts Drawings)			
	017900	Demonstration and Training			
DIVISION 2 - EXISTING CONDITIONS					
	022100	Surveying			
	024100	Demolition			
	024119	Selective Demolition			
	025000	Site Remediation			
		Asbestos			
		Lead Paint			
DIVISION 3 - CONCRETE					
	033000	Cast-in-Place Concrete			
		Footings and Foundations			
		Frost Slabs and Foundations			
		Slab-on-Grades (by floor and/or area)			
		Slab-on-Deck (by floor and/or area)			
		Rooftop Equipment Pads			
		Mechanical Equipment Pads			
	034000	Precast Concrete			
		Wall Panels (by floor and/or area)			
		Hollow Core Planks (by floor and/or area)			
	035416	Hydraulic Cement Underlayment (by floor and/or area)			
	033543	Polished Concrete Finishing			
DIVISION 4 - MASONRY					
	042000	Unit Masonry (by elevation)			
	047200	Cast Stone Masonry (by elevation)			
	047300	Adhered Manufactured Stone Veneer (by elevation)			
DIVISION 5 - METALS					
	051200	Structural Steel Framing (by level)			
	051213	Architectural Exposed Structural Framing (by element if more than one)			
	052100	Steel Joist Framing / Bridging			
	053100	Steel Decking			
		Composite Metal Decking (by floor)			
		Roof Decking			
	054000	Cold-Formed Metal Framing (by elevation and/or area)			
	055000	Miscellaneous Metal Fabrications			
	055113	Metal Pan Stairs (by Stair Tower)			
	055213	Pipe and Tube Railings			
	055600	Equipment Support Systems (by room)			
	057313	Glazed Decorative Metal Railings			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 6 - WOOD AND PLASTICS					
	061053	Miscellaneous Rough Carpentry			
		Interior Wood Blocking / Backing (by floor or area)			
		Exterior Wood Blocking			
		Roof Parapet Blocking			
	061600	Sheathing			
		Exterior Gypsum Sheathing (by Elevation and/or Area)			
		Wood Sheathing (by Elevation and/or Area)			
	064000	Interior Architectural Woodwork			
		Cabinets and Countertops (by floor and/or area)			
		Window Stools (by floor and/or area)			
		Wood Trim (by floor and/or area)			
	064216	Flush Wood Paneling			
	064219	Plastic Laminate-Faced Wood Paneling			
DIVISION 7 - THERMAL AND MOISTURE PROTECTION					
	071326	Self-Adhered Sheet Waterproofing (by elevation)			
	072100	Thermal Insulation			
		Foundation Insulation (if not include in concrete)			
		Continuous Insulation (by elevation, may be included with corresponding veneer)			
		Spray Foam Insulation			
	072419	Water-Drainage Exterior Insulation and Finish System (by elevation)			
	072500	Weather Barriers (by elevation)			
	072726	Fluid-Applied Membrane Air and Water-Resistive Barriers (by elevation)			
	073113	Asphalt Shingles (by area or each building)			
	074113	Metal Roof Panels (by area or each building)			
	074213.16	Metal Plate Wall Panels (by elevation)			
	074213.23	Metal Composite Material Wall Panels (by elevation)			
	074229	Terracotta Wall Panels (by elevation)			
	075323	EPDM Roofing (by area or each building)			
	075416	KEE Roofing (by area or each building)			
	075423	TPO Roofing (by area or each building)			
	076200	Sheet Metal Flashing and Trim (by each specialty flashing shape profile)			
	077100	Roof Specialties			
		Copings (by each type and/or finish)			
	077200	Roof Accessories - Hatches / Accesses			
	078100	Applied Fireproofing (by floor and/or by area)			
	078123	Intumescent Fireproofing (by floor and/or by area)			
	078413	Penetration Firestopping (by floor and/or by area)			
	078446	Joint Firestopping (by floor and/or by elevation)			
	079200	Joint Sealants (by sealant type - JS-'X')			
	079513.13	Interior Expansion Joint Cover Assemblies (by type)			
	079513.16	Exterior Expansion Joint Cover Assemblies (by type)			
DIVISION 8 - DOORS AND WINDOWS					
	081113	Hollow Metal Doors, Frames, and Hardware			
		Hollow Metal Frames (by floor)			
		Hollow Metal Doors (by floor, includes door hardware)			
	081416	Flush Wood Doors and Hardware			
		Flush Wood Doors (by floor, includes door hardware)			
	083113	Access Doors and Frames (by type and by floor)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	083313	Coiling Counter Doors (by area or door tag)			
	083323	Overhead Coiling Doors (by area or by door tag)			
	083613	Section Doors (by area or by door tag)			
	084113	Aluminum-Framed Entrances and Storefronts			
		Framing (by elevation and/or by area)			
		Glazing (by elevation and/or by area)			
		Entrance Doors (by door tag, includes door hardware)			
	084229.23	Sliding Automatic Entrances (by door tag, includes door hardware)			
	084413	Glazed Aluminum Curtain Walls (by elevation and/or by area)			
		Framing (by elevation and/or by area)			
		Glazing (by elevation and/or by area)			
	087100	Door Hardware (included above with each door type)			
	087113	Automatic Door Operators (by operator type - single or double)			
	088000	Glazing (Storefront / Curtain Wall Glazing included above)			
		Borrow Lite Glazing			
		Interior Hollow Metal / Wood Door Glazing			
		Fire Rated Glazing			
	089000	Louvers and Vents (by elevation and/or area)			
DIVISION 9 - FINISHES					
	092116.23	Gypsum Board Shaft Wall Assemblies (by floor and/or by area)			
	092216	Non-Structural Metal Framing (by floor and/or by area)			
	092713	Glass-Fiber-Reinforced Gypsum Fabrications (by type)			
	092900	Gypsum Board (by floor and/or by area)			
		Interior Sound Attenuation Insulation (by floor and/or by area)			
	093013	Ceramic Tiling			
		Floor Preparation (by floor)			
		Crack Isolation / Waterproofing Membranes (by floor)			
		Tiling (by floor and by each finish tag: CT-"X")			
		Accessories and Trims			
	095113	Acoustical Panel Ceilings			
		Grid (by floor and by each grid type)			
		Ceiling Tiles (by floor and by each ceiling tile type)			
	095426	Suspended Wood Ceiling and Wall Panels			
		Framing / Grid (by floor and by each grid type)			
		Wood Slatting (by floor and by each ceiling tile type)			
	096513	Resilient Base and Accessories			
		Base (by floor and by each finish tag)			
		Transitions (by floor)			
	096516	Resilient Sheet Flooring			
		Floor Preparation (by floor)			
		Resilient Sheet (by floor and by each finish tag)			
	096519	Resilient Tile Flooring			
		Floor Preparation (by floor)			
		Resilient Tile (by floor and by each finish tag)			
	096536	Static-Control Resilient Flooring			
		Floor Preparation (by floor)			
		Static-Control Flooring (by floor and by each finish tag)			
	096600	Precast Epoxy Terrazzo (by floor and/or by area)			
	096623	Resinous Matrix Terrazzo Flooring (by floor and/or by area)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	096816	Tile Carpeting			
		Floor Preparation (by floor)			
		Tile Carpeting (by floor and by each finish tag)			
	096816	Sheet Carpeting			
		Floor Preparation (by floor)			
		Sheet Carpeting (by floor and by each finish tag)			
	097200	Wall Coverings (by floor and by each finish tag)			
	098433	Sound-Absorbing Wall Units (by floor and by each finish tag)			
	099113	Exterior Painting (by elevation or by each element)			
	099123	Interior Painting			
		Walls (by floor and or by area)			
		Floor Sealers (by floor and or by area)			
		Fire / Smoke Wall Labeling (by floor and or by area)			
	099672	Fluid Applied Insulating Coating (by area or by building element)			
DIVISION 10 - SPECIALTIES					
	101100	Visual Display Surfaces (by floor and by type)			
	101423	Panel Signage (by floor)			
	102113.13	Metal Toilet Compartments (by rooms)			
	102113.14	Stainless Steel Toilet Compartments (by rooms)			
	102113.19	Plastic Toilet Compartments (by rooms)			
	102123	Cubicles Curtains and Track			
		Tracks (by floor)			
		Curtains (by floor)			
	102600	Wall Protection (by floor and/or by area)			
	102800	Toilet, Bath, and Laundry Accessories (by floor and by each type)			
	104413	Fire Extinguisher Cabinets (by floor and by type)			
	104416	Fire Extinguishers (by floor and by type)			
	105113	Metal Lockers (by room)			
DIVISION 11 - EQUIPMENT					
	117000	Healthcare Equipment (by floor and by each tag)			
DIVISION 12 - FURNISHINGS					
	122413	Roller Window Shades (by floor and by elevation)			
DIVISION 13 - SPECIAL CONSTRUCTION					
	134900	Radiation Protection (by room)			
DIVISION 14 - CONVEYING SYSTEMS					
	142123.16	Machine Room-less Electric Traction Passenger Elevators (by each elevator cab tag)			
	142400	Hydraulic Elevators (by each elevator cab tag)			
DIVISION 21 - FIRE SUPPRESSION					
	210000	Fire Suppression - General			
		Permits			
		Engineering			
		Identification and Labeling			
		Testing / Closeout			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Wet-Pipe Sprinkler System			
		Service Entrance Riser Piping and Equipment			
		Rough-in (by floor)			
		Finish (by floor)			
		Dry-Pipe Sprinkler System			
		Dry System Equipment			
		Rough-in (by floor)			
		Finish (by floor)			
DIVISION 22 - PLUMBING					
	220000	Plumbing - General			
		Permits			
		Identification and Labeling			
		Disinfection			
		Testing, Balancing, and Adjusting / Closeout			
		Sanitary Waste and Vent Piping			
		Underground			
		Rough-in (by each floor)			
		Domestic Water Piping and Specialties			
		Water Service Entrance Equipment, Valves, and Accessories			
		Equipment - Hot Water Heaters / Boilers			
		Underground (if applicable)			
		Rough-in (by each floor)			
		Plumbing Insulation (by each floor)			
		Plumbing Fixtures (by each floor)			
		Storm Drainage Piping			
		Underground			
		Rough-in (by each floor)			
		Roof Drains and Overflow Outlets			
		Plumbing Insulation (by each floor)			
		Natural Gas Systems			
		Meters and Meter Setting Accessories			
		Rough-in (by each floor)			
		Connections to Equipment			
		Painting (exposed gas piping if not included in painting scope of work)			
		Medical Gas and Vacuum Systems			
		Equipment			
		Zone Valves (by each floor)			
		Rough-in (by each floor)			
		Controls / Monitoring Systems			
		Testing / Purifying / Certification			
DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) - MECHANICAL					
	230000	HVAC (Mechanical) - General			
		Coordination Drawings			
		Identification and Labeling			
		Ductwork Pressure Testing			
		HVAC System 'Testing, Balancing, and Adjusting / Closeout			
		Equipment and Piping Identification – HVAC			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Hydronic Piping, Valves, and Specialties			
		HVAC Piping and connections to equipment (by floor)			
		HVAC Insulation (by floor)			
		Radiant Heat Panels			
		Cabinet Unit Heaters			
		Metal Ductwork / Air Inlets and Outlets			
		Shaft Ductwork Mains (for each AHU or RTU)			
		HVAC Shaft Ductwork Insulation (for each AHU or RTU)			
		Supply, Return, and Exhaust branch ductwork (by floor)			
		HVAC Brach Ductwork Insulation (by floor)			
		Diffusers and Grilles (by floor)			
		Breeches and Vents			
		HVAC Equipment			
		Boilers			
		AHU's / RTU's (including curbs)			
		Vibration Isolation Curbs (if applicable)			
		Exhaust Fans (including curbs)			
		Dampers			
		Air Curtains			
		Louvers			
		Unit Heaters			
		Terminal Units (VAV / CV) / Fan Powered Boxes (FPB)			
		Split Systems (including curbs for roof mounted equipment)			
		VFD's			
		Hydronic Pumps			
		Humidifiers			
		Water Treatment Systems			
		Instrumentation and Control for HVAC			
		Headend Equipment			
		Temperature Control Rough-in (by floor)			
		T-stat and Sensors (by floor)			
		Programming			
		System Start-up / Testing / Verification			
DIVISION 26 - ELECTRICAL					
	260000	Electrical - General			
		Permits			
		Temporary Electrical Service (if not included in General Requirements)			
		Temporary Power and Lighting (if not included in General Requirements)			
		Identification and Labeling			
		Site Electrical			
		Excavation / Conduit (Power, Data, Cable, etc.)			
		Electrical Vaults / Pads			
		Site Lighting			
		Excavation / Conduit			
		Concrete Bases			
		Poles / Fixtures			
		Lighted Bollards			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Electrical Distribution			
		Equipment / Gear			
		Overcurrent Protective Device Coordination Study			
		Dry-Type Transformers			
		Generators			
		Automatic Transfer Switches			
		Meter Can			
		Grounding Loop			
		Panelboards (by floor)			
		Disconnect Switches / Fuses (by floor)			
		Conduit (by floor)			
		Feeders / Wire (by floor)			
		Branch Circuits - Power / Lighting			
		Underground (if applicable)			
		Conduit (by floor)			
		Wire (by floor)			
		Devices (by floor)			
		Light Fixtures (by floor)			
		Lighting Controls			
		Connections to Mechanical Equipment (by floor)			
		Lightning Protection			
		Rough-in			
		Cabling on Roof			
		Air Terminals			
DIVISION 27 - COMMUNICATIONS					
	271000	Communications Systems			
		Cabinets, Racks, Frames, and Enclosures			
		Backbone Cabling			
	272000	Voice / Data Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	274000	Audio-Visual Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	275200	Nurse Call Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY					
	281000	Access Control			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	282000	Video Surveillance			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	283000	Security Detection, Alarm, and Monitoring			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	284600	Fire Alarm System			
		Permit			
		Engineering			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
		Emergency Response Communications System			
DIVISION 31 - EARTHWORK					
	311000	Site Clearing			
		Mobilization			
		SWPPP			
		Tree Clearing			
		Site Demolition			
		Temporary Drives and Access Roads			
	312000	Earth Moving			
		Earthwork			
		Grading			
		Building Pad			
DIVISION 32 - EXTERIOR IMPROVEMENTS					
	321216	Asphalt Pavement			
		Limestone Base			
		Standard Duty Pavement			
		Heavy Duty Pavement			
		Miscellaneous Patching			
		Pavement Markings			
	321313	Concrete Pavement			
		Limestone Base			
		Concrete Paving			
	321600	Concrete Curbs, Walks, and Curb Ramps			
		Curbs			
		Ramps			
		Limestone Base			
		Sidewalks			
	323113	Chain Link Fences & Gates			
	323120	Ornamental Fencing			
	323300	Site Furnishings and Amenities			
		Bollards			
		Bollard Covers			
		Furniture			
		Trash Receptacles			
		Site Signage (Stop, Fire Dept. Access, FDC, etc.)			
	328000	Irrigation			
	329000	Plantings			
	329200	Lawns and Grasses			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 33 - UTILITIES					
	331000	Water Utilities			
		Excavation / Backfill / Compaction			
		Water Line - Fire			
		Water Line - Domestic			
		Fire Department Connection			
		Testing			
	333000	Sanitary Sewer			
		Excavation / Backfill / Compaction			
		Piping			
		Manholes			
		Testing			
	334100	Storm Drainage			
		Foundation Drains			
		Excavation / Backfill / Compaction			
		Piping			
		Structures / Inlets			
		Testing			
		Totals			

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
5. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Submittals: Written and graphic information and physical samples that require responsive action. Submittals may be rejected for not complying with requirements.

B. Autodesk Build: The web based project information management system provided by the Architect that enables transfer of files to and from another computer via standard Internet protocols. The site is a secure, dedicated server within which internal and external users are able to access files and processes. Access levels to the software are granted and controlled by the Architect.

C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and, if applicable Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's and, if applicable, Construction Manager's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Contractor must accept the conditions stated in the Electronic File Transfer documents provided at the end of this section.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently. Do not submit partial submittals.
3. 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. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 business days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and, if applicable Construction Manager.
4. Transmittal Form for Electronic Submittals: Attach submittal in PDF format**,** containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and, if applicable Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's and, if applicable Construction Manager's action stamp.

H. 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.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and, if applicable Construction Manager's or Contractor's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals as PDF electronic files, using the Architect's web-based project management system.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Assemble and submit submittals required by individual Specification Sections into single packages incorporating all submittal requirements of the individual Specification Section. Do not submit individual items required by the Specification section as separate transmittals. Where possible, submit related items of Work required by the individual Sections concurrently to allow for concurrent review.

a. Submittal Submissions shall comply with the following:

1) Shall not include any SDS – Safety Data Sheets. Any submittals submitted containing this information will either not be reviewed and returned for resubmittal or the Safety Data Sheets will be deleted from the submittal package prior to being returned to the Construction Manager.
2) All product data, install instructions, etc. information shall be the manufacturer's current most current information.
3) All information must be clear and legible (scans upon scans upon scans will not be accepted). PDF's downloaded directly from the manufacturer's website are preferred.

4) All information shall be highlighted, checked, circled, marked, or identified in some way for the reviewer to easily determine which product, options, accessories, etc. are being proposed by the contractor.
5) All questions regarding a submittal item (i.e. – shop drawings, etc.) shall be "clouded" for the reviewer to address and respond as a part of the submittal review comments.
6) Any deviations from the contract documents (i.e. – dimensional changes, etc.) shall be "clouded" for the reviewer to address and respond as a part of the submittal review comments.
7) Product or system specific "Shop Drawings" shall be prepared by the contractor or supplier shall be generated via a software specific to their trade. Photo copies of the Construction Documents with notes added will not be accepted.
8) All product submittals shall be from a manufacturer specified in the Contract Documents for each product. Submittals from a manufacturer not specified will be rejected and returned for resubmission.

    a) If a Contractor wishes to submit a product substitution, they may do so by contacting and completing the substitution request form provided by the Architect.
    b) NOTE: Prior to reviewing any substitution request, the Contractor shall agree to pay for the costs of the Architect (and/or its Consultant's) time to review any substitution request. In the event that a product specified is no longer available, the Architect's fees will be waived.

9) All product submittals shall include any corresponding equipment, device, system, etc. tags indicated in the contract documents for each product submitted (i.e.: "PL-1", "RB-1", "WC-1", "TMV-1", "PRV-1, "RP-x-x", "VVB-x-x", Light Fixture Identifier, Electrical Panel Tags, etc.).
10) All project submittals that are electrified or require control wiring between components (i.e.: door hardware, med gas systems, etc.) must include complete, project specific wiring diagrams for these electrified products.
11) All product submittals shall also contain the manufacturer's installation instructions.
12) All "physical" samples and finish and color selection product data must be submitted by the Contractor through the Architect's Project Management Software so the submittal review process is initiated and recorded in the software application. Upload photos of the product samples being submitted.

    a) The "physical" sample and finish color selection submittal shall be delivered concurrently to the Architect for review. Color samples will not be selected from an electronic reproduction or color chart.

3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

2.2 SUBMITTALS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are 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 catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.
    h. Include graphic scale on all drawings.

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 42 inches.

C. 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 applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. Provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples 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.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one 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.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

K. LEED Submittals: Refer to Section 018113 and comply with requirements when applicable.

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit 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.

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Design Data: Prepare and submit 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.

2.3 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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. Project Closeout and Maintenance Material Submittals: See requirements in Division 1 Section "Closeout Procedures."

C. 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 ARCHITECT'S ACTION

A. Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal and will mark stamp appropriately to indicate action.

B. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

C. Submittals not required by the Contract Documents may be returned by the Architect without action.

3.3 ELECTRONIC FILE TRANSFERS

A. See attached Electronic File Transfer forms.

END OF SECTION

HASENSTAB ARCHITECTS, INC.

ELECTRONIC FILE TRANSFER TO CONTRACTOR

Contractor: _____

Project: _____

Upon request, Hasenstab Architects and their consultants will provide electronic files for the Contractors convenience and use in the preparation of shop drawings related to the above mentioned project, subject to the following terms and conditions:

Hasenstab Architects make no representation as to the compatibility of these files with the Contractors hardware or software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of Hasenstab Architect's instruments of service and shall not be used by the Contractor or anyone else receiving these data through or from the Contractor for any purpose other than as a convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at their sole risk and without liability or legal exposure to Hasenstab Architects and their consultants. The Contractor agrees to make no claim and hereby waives, to the fullest extent permitted by law, any claim or cause of action of any nature against Hasenstab Architects and their consultants, officers, directors, employees, agents, or sub-consultants that may arise out of or in connection with the use of the electronic files.

Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold Hasenstab Architects and their consultants, harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the Contractors use of these electronic files.

These electronic files are not construction documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. Hasenstab Architects and their consultants make no representation regarding the accuracy or completeness of the electronic files received. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by Hasenstab Architects and their consultants, and the electronic files, the signed or sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By the Contractors use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work with that of other contractors for the project. The Contractor assumes full responsibility for incorporation of all manual modifications, addenda, bulletins, clarifications and Change Orders to the Drawings.

Because information presented on the electronic files can be modified, unintentionally or otherwise, Hasenstab Architects and their consultants reserve the right to remove all indication of ownership and/or involvement from each electronic display.

Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by Hasenstab Architects and their consultants, and Hasenstab Architects or their consultants make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Hasenstab Architects and their consultants be liable for any loss of profit or any consequential damages as a result of the Contractors use or reuse of these electronic files.

ACCEPTANCE OF CONTRACTOR (Authorized Representative)

BY: _____

TITLE: _____

DATE: _____

HASENSTAB ARCHITECTS, INC.

ELECTRONIC FILE TRANSFER TO OUTSIDE AGENCY (OA)

Outside Agency (OA): _____

Project: _____

Upon request, Hasenstab Architects and their consultants will provide electronic files for the Outside Agency's convenience and use related to the above mentioned project, subject to the following terms and conditions:

Hasenstab Architects make no representation as to the compatibility of these files with the Outside Agency's hardware or software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of Hasenstab Architect's instruments of service. Use or reuse by the Outside Agency or by others will be at their sole risk and without liability or legal exposure to Hasenstab Architects and their consultants. The Outside Agency agrees to make no claim and hereby waives, to the fullest extent permitted by law, any claim or cause of action of any nature against Hasenstab Architects and their consultants, officers, directors, employees, agents, or sub-consultants that may arise out of or in connection with the use of the electronic files.

Furthermore, the Outside Agency shall, to the fullest extent permitted by law, indemnify and hold Hasenstab Architects and their consultants, harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the Outside Agency's use of these electronic files.

These electronic files are not construction documents. Hasenstab Architects and their consultants make no representation regarding the accuracy or completeness of the electronic files received. By the Outside Agency's use of these electronic files, the Outside Agency is not relieved of their duty to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work.

Because information presented on the electronic files can be modified, unintentionally or otherwise, Hasenstab Architects and their consultants reserve the right to remove all indication of ownership and/or involvement from each electronic display.

Under no circumstances shall delivery of the electronic files for use by the Outside Agency be deemed a sale by Hasenstab Architects and their consultants, and Hasenstab Architects or their consultants make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Hasenstab Architects and their consultants be liable for any loss of profit or any consequential damages as a result of the Outside Agency's use or reuse of these electronic files.

ACCEPTANCE OF OUTSIDE AGENCY (Authorized Representative)

BY: _____

TITLE: _____

DATE: _____

HASENSTAB ARCHITECTS, INC.

ELECTRONIC FILE TRANSFER TO OWNER OR OWNER'S CONSULTANT

Recipient: _____

Project/Facility: _____

Upon request, Hasenstab Architects and their consultants may provide electronic files for the Owner's and/or Owner's Consultants use related to the above mentioned project, subject to the following terms and conditions:

Hasenstab Architects makes no representation as to the compatibility of these files with any hardware or software beyond the current supported versions of software for the requested data format.

Data contained on these electronic files are part of Hasenstab Architect's instruments of service. Any other use or reuse by others will be at their sole risk and without liability or legal exposure to Hasenstab Architects and their consultants. The Recipient agrees to make no claim and hereby waives, to the fullest extent permitted by law, any claim or cause of action of any nature against Hasenstab Architects and their consultants, officers, directors, employees, agents, or sub-consultants that may arise out of or in connection with the use of the electronic files.

Furthermore, the Recipient shall, to the fullest extent permitted by law, indemnify and hold Hasenstab Architects and their consultants, harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the Recipients use of these electronic files.

These electronic files are not record documents. Differences may exist between these electronic files and corresponding hard-copy documents. Hasenstab Architects and their consultants make no representation regarding the accuracy or completeness of the electronic files received. The Recipient shall be responsible for determining if any conflict exists. The Recipients are not relieved of their duty to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work with the as-built conditions for the project.

Because information presented on the electronic files can be modified, unintentionally or otherwise, Hasenstab Architects and their consultants reserve the right to remove all indication of ownership and/or involvement from each electronic display.

Under no circumstances shall delivery of the electronic files for use by the Recipient be deemed a sale by Hasenstab Architects and their consultants, and Hasenstab Architects or their consultants make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Hasenstab Architects and their consultants be liable for any loss of profit or any consequential damages as a result of the Recipients use or reuse of these electronic files.

ACCEPTANCE OF RECIPIENT (Authorized Representative)

BY: _____

TITLE: _____

DATE: _____

Hasenstab Architects, Inc.

SUBMITTAL / TRANSMITTAL FORM

Project: Northeast Ohio Medical University
Library Renovation

HAI Project No.: 26028.000
Construction Documents

Architect: Hasenstab Architects, Inc. (HAI)
190 North Union Street, Suite #400
Akron, Ohio 44304
Telephone: (330) 434-4464

Attn: [HAI Contact (HAI Contact's Email)]

Contractor: [Company Name]
[Company Mailing Address]
[Company Shipping Address]
[City, State Zip-Code]

Attn: [Company Contact]

Submittal - From/To:	Quantity:	Date:	Sent Via:	Complete Copy To:	Transmittal Cover Only To:

Submittal Description - Do not combine multiple submittals on single Submittal Form	Dwg. No.	Spec. Section	Mfg / Supplier / Sub-Contractor	Arch/Consult Action	Architects Submittal No.
Times submitted (Check Box) 1 ☑ 2 ☐ 3 ☐ 4 ☐ 5 ☐					

Contractor Comments (If more room is needed for Contractor Comments, please attach a separate sheet):

The Contractor has reviewed and approved the attached submittal as per the requirements of the Contract Documents.

Signed: **Date:**

STOP: THE FOLLOWING INFORMATION IS TO BE COMPLETED BY THE ARCHITECT

Reviewing is for general conformance with the design concept of the Project and general compliance with the Contract Documents only. The Contractor is responsible for fabrication process, techniques, confirming dimensions and quantities and the coordination of the Work of all trades. These responsibilities are delineated in complete detail in the Contract Documents.

Architect Action:

This material is being returned with the action indicated above (Arch/Consult Action) in accordance with the following legend:

1. No Exceptions Taken
2. Make Corrections Noted
3. Submit Specified Items
4. Revise and Resubmit
5. Review Not Required
6. Rejected
7. Reviewed by Consultant - See attached Comments
8. See Architect's Comments Below (or attached sheet)

Architect's Comments:

Signed: **Date:**

HAI File: [PROJECT NUMBER 24088.000]/CA/Submittals

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 "Statement of Special Inspections" for test and inspections required by Ohio Building Code and procured by the Owner.
2. Division 01 Section “Mock-ups” for construction of mock-ups.
3. Divisions 02 through 33 Sections for specific test and inspection requirements.

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 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 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.

1.6 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 products 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. 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. 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.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

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.

B. 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 01 Section "Submittal Procedures."

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect 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 Project Coordinator.
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.

E. 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.

F. 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.

G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 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 01 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

SECTION 014200

REFERENCES

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thorson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," 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 additional manufacturers named in the specification.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine 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. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See Divisions 02 through 33 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, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both manufacturers and products, 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. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Provide custom color or finish if required.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches. Provide custom color or finish if required.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
2. No additional compensation will be owed to the Contractor for matching Architect’s sample.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION

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. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Cutting and patching.

B. Related Sections:

1. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.

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 construction to original conditions after installation of other work.

C. Selective Demolition is recognized as a related but separate category of Work, which may or may not require cutting and patching as defined in this Section.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection. Engage a Structural Engineer registered in jurisdiction of the Work to verify activities and procedures.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to the following:

a. Primary operational systems and equipment.

b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Mechanical systems piping and ducts.
f. Control systems.
g. Communication systems.
h. Conveying systems.
i. Electrical wiring systems.
j. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Equipment supports.
e. Piping, ductwork, vessels, and equipment.
f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. 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.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. 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.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CUTTING AND PATCHING

A. Cutting and Patching, 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. Temporary Support: Provide temporary support of work to be cut.

C. 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.

D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Existing Utility Services and Mechanical, Plumbing, and Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize, or where feasible in Architects opinion, prevent interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical, Plumbing 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.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. For an assembly, refinish the entire unit. Provide additional coats until patch blends with adjacent surfaces. Except where indicated otherwise, finish sheen and color to match existing.

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.

6. Floor and Wall Penetrations: Where pipes, conduits, ducts and other items are removed from floors and walls resulting in openings, Contractor responsible for the items removal shall patch the resulting opening with materials matching the existing adjacent construction and as required to maintain fire ratings.
7. Demolished Walls: Where walls are removed and recesses in the floor substrate result, the Contractor responsible for removal of the wall shall patch the floor level with the adjacent substrate for subsequent finish floor installation.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

1. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

END OF SECTION

SECTION 024119

SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Division 01 Section "Summary" and "Work Restrictions" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Division 01 Section "Execution" and "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and preconstruction recordings.

F. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

G. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.2 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.3 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch and portable fire-suppression devices for at least two hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

1. Do not use methods requiring solvent-based adhesive strippers.

B. Wall Coverings: Removal of existing wall coverings, where walls are to remain, is to be performed by individuals with experience in their removal.

1. Use appropriate techniques as not to damage the paper facing of gypsum board substrates.

C. Burning: Do not burn demolished materials.

3.5 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 061053

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes, but is not limited to the following:

1. Wood blocking and nailers.
2. Plywood blocking.
3. Plywood backing panels.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency when requested by Authority Having Jurisdiction.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency when requested by Authority Having Jurisdiction.

D. Application: Pressure treated wood as indicated on the drawings and in the following locations that are not required to be fire-retardant.

1. Wood placed in direct contact with soil or subject to insect infestation.
2. Wood placed in direct contract with concrete, concrete masonry or any below grade application subject to moisture over time.
3. Wood exposed to exterior weather.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: FRT Wood as indicated on Drawings and the following locations:

1. Schedule – Provide FRT materials as follows:

a. Plywood backing panels.
b. Framing at locations listed below.

2. Fire-retardant-treated wood framing may be used in non-combustible Construction Types per the following:

a. Combustible materials shall be permitted in buildings of Type I or Type II construction in the following applications and in accordance with the 2017 Ohio Building Code, Section 603.1 Allowable Materials, Items 1.1 through 1.3:
b. Fire-retardant-treated wood shall be permitted in:

1) 1.1 Nonbearing partitions where the required fire-resistance rating is 2 hours or less.
2) 1.2 Nonbearing exterior walls where no fire rating is required.
3) 1.3 Roof construction, including girders, trusses, framing and decking.

a) Exception: In Buildings of Type IA Construction exceeding two stories in height, fire-retardant-treated wood is not permitted in roof construction when the vertical distance from the upper floor to the roof is less than 20 feet.

3. Wood blocking is not required to be fire-retardant treated in the three locations listed and described above (nonbearing partitions, nonbearing exterior walls and roof construction that are fire-retardant treated framing) per the 2017 Ohio Building Code, Section 603.1 Allowable Materials, Items 12 and 18:

a. 12. Blocking such as for handrails, millwork, cabinets and windows and door frames.
b. 18. Nailing or furring stripes as permitted by Section 803.1.1.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including, but not limited to the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 and maximum moisture content of 19 percent.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.

2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

E. Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.

F. Carbon Steel Bolts: ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.

G. Stainless Steel Bolts: ASTM F593, Alloy Group 1 or 2 with ASTM F594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.

H. Post-Installed Anchors: Chemical or torque-controlled expansion anchors of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved. Locations include, but are not limited to the following applications:

1. Casework.
2. Miscellaneous and toilet room accessories.
3. Infant changing stations.
4. Shower seats.
5. Automatic door operators.
6. Wall mounted door stops.
7. Wall mounted accessories.
8. Wall mounted fire extinguishers.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Urethane joint sealants.
2. Latex joint sealants.
3. Mildew-resistant joint sealants.
4. Acoustical joint sealants.

B. Related Sections:

1. Division 08 Section "Glazing" for glazing sealants.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty for Exterior Joints: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

A. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag or pourable, traffic and nontraffic-grade, urethane joint sealant: ASTM C 920, Type M, Grade NS or P, Class 25, for Use T (horizontal traffic locations).

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation Construction Systems; MasterSeal NP2 or MasterSeal SL2.
b. Pecora Corporation; Dynatred or Dynatroll II SG.
c. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
d. Tremco Incorporated; Vulkem 116+catalyst or THC-901.

B. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT (vertical and horizontal non-traffic locations).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pecora Corporation; Dynatrol II.
b. Tremco Incorporated; Dymeric 240 FC.

2.3 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Building Systems; Sonolac.
b. Pecora Corporation; AC-20+.
c. Sherwin Williams Company; 950A.
d. Tremco Incorporated; Tremflex 834.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Building Systems; Omniplus.
b. Dow Corning Corporation; 786 Mildew Resistant.
c. GE Advanced Materials - Silicones; Sanitary SCS1700.
d. Tremco Incorporated; Tremsil 200 Sanitary.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:

a. OSI Sealants; Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
b. Pecora Corporation; AC-20 FTR.
c. Tremco Incorporated; Tremco Acoustical Sealant.
d. USG Corporation; SHEETROCK Acoustical Sealant.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. 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.

B. 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 to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or

deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant JS-1: Urethane, M, NS, 25, T, NT.

1. Joint Locations: Exterior and interior joints in horizontal traffic surfaces

a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Tile flooring control and expansion joints.
c. Joints between different materials listed above.
d. Other joints as indicated.

2. Joint-Sealant Color(s): As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant JS-3: Urethane, M, NS, 50, NT.

1. Joint Locations: Interior joints in vertical and horizontal nontraffic surfaces

a. Construction joints in cast-in-place concrete(vertical).
b. Control and expansion joints in unit masonry.
c. Control and expansion joints in wall tile.
d. Gaps between bottom of door frames and floor finishes.
e. Other joints as indicated.

2. Joint-Sealant Color(s): As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant JS-6: Acrylic Latex.

1. Joint Locations: Interior joints in vertical surfaces and horizontal nontraffic surfaces

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints on exposed interior side of exterior openings.
c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
d. Other joints as indicated.

2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant JS-7: Mildew Resistant, Silicone, S, NS, 25, acid curing.

1. Joint Sealant Location: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Plumbing fixture piping where it penetrates walls.
c. Countertop backsplashes where they meet countertops and walls.
d. Tile control and expansion joints where indicated.
e. Other joints as indicated.

2. Joint-Sealant Color: Clear/Translucent.

E. Joint-Sealant JS-8: Acoustical.

1. Joint Location: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces

a. Acoustical joints where indicated.
b. Other joints as indicated.

2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 091001

FLOOR PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes hydraulic cement floor underlayments:

1. Trowelable underlayment.
2. Floor substrate testing.
3. Floor substrate preparation and remediation.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers product data and installation instructions for each type of product indicated.

B. Test Reports: Submit field test reports, with location of test indicated for the following;

1. Concrete slab moisture vapor transmission rate.
2. Concrete slab alkalinity.
3. Concrete slab absorption (porosity).

C. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer must be approved by manufacturer for application of underlayment products required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1. Store materials in a dry area with temperatures maintained between 50 deg F and 85 deg F and protect from sunlight.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 65 and 80 deg F.

1.7 COORDINATION

A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

B. Preinstallation Conference: Conduct conference at project site coordinated with the various floor-covering products Preinstallation Conference.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 GENERAL

A. Resilient Flooring Installations.

1. At all resilient flooring installations, the entire floor substrate is to have a continuous trowelable underlayment applied to produce a uniform and smooth substrate.

2.3 HYDRAULIC CEMENT TROWELABLE UNDERLAYMENTS (Trowelable Underlayment)

A. Trowelable Underlayment: Polymer-modified, trowelable, hydraulic-cement product that can be applied to a maximum uniform thickness of 1/2 inch and that can be feathered at edges to match adjacent floor elevations.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ardex; SKM or Feather Finish.
b. Euclid Chemical Company; Tamms Thin Patch
c. MAPEI Corporation; Planipatch.
d. Schonox- HPS North America, SL.

2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.

3. Compressive Strength: Not less than 3,500 psi at 28 days when tested according to ASTM C 109/C 109M.
4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

2.4 ACCESSORIES

A. Water: Potable and at a temperature of not more than 70 deg F.

B. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

1. Primer products are to be determined and approved by manufacturer for specific concrete substrates that are either absorbent or are determined to be non-porous.

C. Low Viscosity Rigid Joint Filler: Two-part polyurethane or epoxy with low viscosity for filling cracks and control joints (saw cuts) prior to installation of cementitious underlayments.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ardex; Ardex Ardifix, Low Viscosity Rigid Polyurethane Crack and Joint Filler.
b. Euclid Chemical Company., Inc.; EUCO 700, Semi-Rigid Industrial Floor Joint Filler.
c. MAPEI Corporation; Planibond JF, Semi-Rigid, Epoxy Joint Filler.
d. Schonox- HPS North America, SGH.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks and control joints (sawcuts) according to manufacturer's written instructions to prevent cracks and control joints from telegraphing (reflecting) through underlayment.

a. Dormant, non-moving cracks and control joints (sawcuts) are to be cleaned out full depth or opened up with a crack chaser saw as required.
b. Follow by vacuuming cracks and joints so they are free of all dust, dirt, oils and any other debris.

2. Fill any substrate voids to prevent underlayment from leaking.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Mechanically remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

    a. Shotblast areas with contaminants or use another manufacturer approved method that is done per the International Concrete Repair Institute Guideline ICRI No. 312.R2.2013.
    b. Removal must be deep enough to eliminate all penetrated contaminants down to sound, solid concrete.

3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 7 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following (Note that the two following tests are not required if concrete porosity inhibiting admixture or moisture vapor reduction admixture is used):

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1,000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level, at ¼ slab depth.

5. Absorption (Porosity) Testing: Concrete substrates are to be tested to establish the substrates water absorption (porosity). This assessment will allow the determination of appropriate surface preparation and which of the manufacturer's primers are to be utilized.

    a. Test for porosity per ASTM F3191.
    b. Extremely absorbent concrete may require two applications of primer per manufacturer's instructions.
    c. Concrete treated with admixtures may be non-porous. Prepare surfaces according to manufacturer's written instructions and provide manufacturer's recommended primer.

C. Remove existing flooring, including underlayments, and setting beds (where applicable) to expose a sound substrate. Grind substrates if required to thoroughly remove any traces of the floor material adhesive or other foreign material.

D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
3. Substrate Expansion, Isolation, and other Moving Joints: Allow joint of same width to continue through underlayment.

a. Expansion and isolation joints, and any other joint that will move, must be honored/kept clear of underlayment materials.

1) Seal joints with backer rod and flexible sealant after installation of the topping underlayment system at locations that are not designated to receive an expansion joint cover.

4. Cracks and Control Joints: Treat dormant, non-moving cracks and dormant control joints (sawcuts) as follows:

a. Hairline cracks less than 1/32" can have trowelable underlayment troweled down into them.
b. Non-moving control joints and cracks up to 1/8" are to have trowelable underlayment placed to refusal or low viscosity rigid joint filler full depth.

1) Sand broadcast over low viscosity rigid joint filler as required by underlayment manufacturer's instructions.

c. Non-moving control joints and cracks over 1/8" are to have low viscosity rigid joint filler full depth.

1) Sand broadcast over low viscosity rigid joint filler as required by underlayment manufacturer's instructions.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Trowelable Underlayments: Apply to produce a uniform, smooth surface.

1. Apply a continuous skim coat over entire floor surface.

a. Install at the thickness required so that dormant joints and cracks and surface profile irregularities will not telegraph through the floor covering.

1) Minimum thickness to not be less than 1/16" (0.063").

2. Apply trowelable underlayment at required thickness to correct subfloor irregularities and floor depressions.
3. Feather edges to match adjacent floor elevations, floors at drains and expansion and isolation joints.
4. Apply trowelable underlayment at transition edge between resilient flooring and dissimilar flooring materials to allow for a "flush" transition. The slope of the underlayment shall provide for a gradual transition to the thicker flooring material.
5. Apply trowelable underlayment at door openings where the bottom of door frames are above the concrete slab surface.

a. Place trowelable underlayment up to the bottom of the door frames and continuous at this height across the door opening.
b. Feather the trowelable underlayment down in both directions from the door opening over a distance of 24 inches.

6. Trowelable underlayment shall be steel troweled smooth and sanded. Trowel marks showing through installed flooring shall be reason to remove flooring and sand out trowel marks.
7. Provide sloped underlayment at drains and where indicated.

D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 092216

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

1.3 SUBMITTALS

A. Product Data: Manufacturers technical literature for each type of product and system indicated.

1. Include manufacturers specifications for materials, construction details and installation instructions.
2. For embossed stud products, provide manufacturers limiting height tables for the stud framing being used and highlight the studs being proposed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. Sound Control Partitions: For sound control assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Horizontal Deflection:

1. For composite and non-composite wall assemblies, limited to L/240 of the wall height based on horizontal loading of 5 lbf/sq. ft.
2. For composite and non-composite wall assemblies with applied ceramic tile, limited to L/360 of the wall height based on horizontal loading of 5 lbf/sq. ft.

D. Steel Stud Manufacturers Association (SSMA): Conventional metal stud designations, stud and track section properties, limiting wall heights, bracing requirements and other requirements are to be based

on the SSMA Technical Guide as well as requirements adopted by the Authority Having Jurisdiction and the stud and track manufacturers product data.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 and ASTM C645, Section 10 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 (Z120) hot-dip galvanized unless otherwise indicated.

a. Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120) or Clark Dietrich DiamondPlus® coating; roll-formed from steel meeting mechanical and chemical requirements of ASTM A 1003 with a zinc-based coating are acceptable. Galvannealed products are not acceptable.

1) Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authorities having jurisdiction.

b. Provide G60 (Z180) for structural designated framing.

3. Definitions - The following are to aid in the use of this specification and to indicate when channel bridging is required for wall bracing. Refer to metal framing manufactures definitions and requirements and with the SFIA or SSMA definitions and requirements for wall assembly design.

a. Composite Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed full height on both sides steel stud and track framing. No horizontal bracing (Channel Bridging) required.
b. Non-Composite Fully Braced Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed on steel stud and track framing.

1) Gypsum board installed only to ceiling height on both sides to have horizontal bracing (Channel Bridging) as required through the framing above the gypsum board.
2) Gypsum board installed full height one side and ceiling height on the other to have horizontal bracing (Channel Bridging) as required through the framing above the gypsum board.

c. Non-Composite Braced at 48” o.c. Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed full height on one side of steel stud and track framing. Framing to have horizontal bracing (Channel Bridging) at 48 inches on center with horizontal bracing maximum 12 inches from the top of the assembly.

B. Studs and Tracks: AISI S220 and ASTM C645, Section 10. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks as follows:

1. Conventional Steel Studs and Tracks:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products may be incorporated into the work.

b. Typical Minimum Base-Steel Thickness: 0.0296 inch (30 mil, 33 ksi) unless horizontal deflection performance requires greater thickness.

1) Structural Studs: Provide 0.0329-inch (33 mil, 33 ksi) or 0.0428-inch (43 mil, 33 ksi) studs at locations where indicated on Drawings and as required for horizontal deflection requirements.

c. Flange Size: 1-1/4 inches for 30 and 33 mil, minimum 1-3/8 inches for 43 mil.
d. Web Depth: As indicated on Drawings.
e. Maximum Spacing: 16 inches on center, unless noted otherwise.

2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members matching conventional ASTM C645 steel studs and tracks.

a. Manufacturers/Products: Subject to compliance with requirements provide products by one of the following:

1) Clark Dietrich; ProSTUD 30 (30 mil., 33 ksi).
2) MarinoWARE; Viper 30 (30 mil., 33 ksi).
3) Telling Industries; Viper 30 (30 mil., 33 ksi).

b. Flange Size: 1-1/4 inches.
c. Web Depth: As indicated on Drawings.
d. Maximum Spacing: 16 inches on center, unless noted otherwise.

3. Embossed Steel Studs and Tracks, Equivalent Gage: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.

a. Contractor is to verify that proposed wall assemblies meet manufacturers limiting wall heights per listed requirements and manufacturers definitions and requirements for stud and track thickness proposed for use.
b. Manufacturers/Products: Subject to compliance with requirements provide products by one of the following:

1) Clark Dietrich; ProSTUD 20 EQ (18 mil., 70 ksi).
2) MarinoWARE; Viper 20 EQ (18 mil., 70 ksi).
3) Telling Industries; Viper 20 EQ (18 mil., 70 ksi).

c. Minimum Base-Steel Thickness: 0.0181-inch (18 mil.) unless horizontal deflection performance requires greater thickness.

1) Minimum Design Thickness: 0.0190 inch.

d. Flange Size: 1-1/4 inches.
e. Web Depth: As indicated on Drawings.
f. Maximum Spacing: 16 inches on center.

C. Slip-Type Head Joints: Typical at all Wall Assemblies unless indicated otherwise. Provide the following:

1. Single Long-Leg Track System: AISI S220 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous

bridging, at Non-Composite walls, located within 12 inches of the top of studs to provide lateral bracing.

D. Flat Strap and Backing Plate (Strap Backing Plate): Steel sheet for blocking and bracing in length and width indicated.

1. Reinforcing for wall mounted items:

a. Minimum Base-Steel Thickness: 0.0428 inch (18 Ga.) unless noted otherwise.

2. Reinforcing for wall protection, handrails, wall guards and where noted:

a. Minimum Base Metal Thickness: 0.0538 inch. (16 Ga.).
b. Width: 6 inches; provide 8 inches for low wall guard applications.
c. Mount at height required by details.

3. Reinforcing for cabinets, casework and where noted:

a. Minimum Base Metal Thickness: 0.067 inch. (14 Ga.).
b. Width: 6 inches.
c. Mount at height required by details.

E. Channel Bridging: Use the bridging channels that correspond with the steel stud and track system that is being used.

1. Conventional Steel Studs and Tracks – Steel U-Channel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.

a. Depth: 1-1/2 inches.
b. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

2. Embossed Steel Studs and Tracks - Pre-notched steel, 7/8 inch by 7/8 inch by 50 inches, 0.0329-inch minimum base steel thickness.

a. Product: Provide Clark-Dietrich Spazzer 9200 Bridging and Spacer Bar or equivalent product by other approved manufacturers.

F. Hat-Shaped, Rigid Furring Channels: AISI S220.

1. Minimum Base-Steel Thickness: 0.0296 inch.
2. Depth: As indicated on Drawings.

G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical (single leg) or hat shaped (double leg).

a. Minimum Base Metal Thickness: 0.0296 inch.

2. Embossed Resilient Furring Channels:

a. Minimum Base Metal Thickness: 0.022 inch.
b. Product: Provide Clark-Dietrich RC-1 Pro Resilient Channel – Single Leg or equivalent product by other approved manufacturers.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

J. Radius Framing: Steel sheet track for non-load-bearing curves, bends, variable radii and arches. Framing can be made from cut track or subject to compliance with requirements from the available products.

1. Minimum base-metal thickness: 0.0273 inch.
2. Depth: As indicated on drawings.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or AC308 as appropriate for the substrate.

a. Uses: Securing hangers to structure.
b. Type: Torque-controlled expansion anchor, torque-controlled adhesive anchor or adhesive anchor.
c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches unless indicated otherwise on Drawings.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Steel Studs and Tracks: AISI S220 and ASTM C645, Section 10.

    a. Minimum Base-Steel Thickness: 0.0296 inch.
    b. Depth: As indicated on Drawings.

3. Embossed, High-Strength Steel Studs and Tracks: AISI S220 and ASTM C645, Section 10.

    a. Minimum Base-Steel Thickness: 0.0181 inch
    b. Depth: As indicated on Drawings.

4. Hat-Shaped, Rigid Furring Channels: AISI S220, 7/8 inch deep.

    a. Minimum Base-Steel Thickness: 0.0296 inch.

5. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

    a. Configuration: Asymmetrical or hat shaped.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension System.
    c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been

installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials (where applicable):

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

C. Install sill sealer gaskets at exterior walls to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

F. Framing cannot be supported by the roof decking.

1. Soffit framing and any other framing that does not bear on floor structure cannot be fastened to and supported by the overhead roof deck. Framing must be supported by the structural roof framing by using non-structural metal framing, cold-formed metal-framing or steel angle or channel shapes as required.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
2. Multilayer Application: 16 inches o.c., unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c., unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Cut top and bottom track/runners through leg and web at 2-inch intervals for arc length. In cutting lengths of runners, allow for uncut straight lengths of not less than 12 inches at ends of arcs.
    b. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    c. Support outside (cut) leg of track/runners by clinching a 1-inch high by 0.0209-inch thick steel sheet strip to inside of cut legs using metal lock fasteners.
    d. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of

attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to sizes and spacings indicated on the Drawings, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

1. Install system per manufacturer's instructions.
2. Install systems per UL rated assemblies indicated.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Sound attenuation blankets.

B. Related Requirements include the following:

1. Division 09 Section "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Sound Control Partitions: For sound-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. General: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. Georgia-Pacific Building Products.
c. National Gypsum Company.
d. USG Corporation.

B. Gypsum Wallboard:

1. Regular Type: For vertical surfaces unless indicated otherwise.

a. Thickness: Refer to wall type schedule on drawings.
b. Long Edges: Tapered.

2. Type X: Where indicated or required for fire resistance rated assemblies.

a. Thickness: 5/8 inch.
b. Long Edges: Tapered.

3. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

a. Thickness: 1/4 inch.
b. Long Edges: Tapered.

4. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

a. Thickness: 1/2 inch.
b. Long Edges: Tapered.

5. Mold-Resistant Type: With moisture- and mold-resistant core and paper surfaces.

    a. Core: 5/8-inch, Type X.
    b. Long Edges: Tapered.
    c. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Georgia-Pacific Building Products.
    c. National Gypsum Company.
    d. USG Corporation.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

B. Acoustically Enhanced Gypsum Board: ASTM C1396/C1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.

1. Basis of Design: Subject to compliance with requirements, provide National Gypsum Company, Gold Bond Brand Soundbreak XP or one of the following products:

    a. CertainTeed Gypsum; SilentFX QuickCut.
    b. PABCO Gypsum, QuietRock 530.

2. Core: 5/8-inch, Type X.
3. Long Edges: Tapered.
4. See drawings for Sound Control Partitions that include acoustically enhanced gypsum board.
5. See Auxiliary Materials in this section for sound-attenuation blankets, acoustical sealant and acoustical putty sheets that are to be used in Sound Control Partitions.

2.5 TRIM ACCESSORIES

A. Interior Trim (Vinyl Trim): ASTM C 1047.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Trim-Tex Drywall Products.

2. Material: Rigid PVC.

    a. Surface-Burning Characteristics: Comply with ASTM E84 for flame spread and smoke developed to achieve Class A rating.

3. Shapes:

a. Cornerbead.
b. Expansion (control) joint, V Bead style; with tear-away bead.
c. L-Bead: L-shaped; with tear-away bead. Exposed long flange receives joint compound.
d. Curved-Edge Cornerbead: With notched or flexible flanges and tear-away bead.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound.

a. High-build interior coating product designed for application by airless sprayer may be used instead of skim coat to produce Level 5 finish.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Sound-Attenuation Blankets are to be installed at all Sound Control Partitions and any other designated locations.

E. Acoustical Joint Sealant: As specified in Division 07 Section "Joint Sealants."

1. Acoustical sealant is to be used at all Sound Control Partitions and any other designated locations.

F. Acoustical Putties: Nonhardening, non-corrosive, water-resistant, acoustical putties containing no solvents or inorganic fibers.

1. Acoustical putty sheets are to be used at all Sound Control Partitions and any other designated locations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, including welded hollow-metal frames and support framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Install panels off of base floor substrate. Provide 1/8 inch to 1/4-inch-high maximum space at floor.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Form control and expansion joints with space between edges of adjoining gypsum panels. Each board should be supported by separate framing members.

1. Install control joints in accordance with the manufacturer's recommendations and where shown on the drawings, in addition to the following:

a. Locate joints at points of maximum stress and/or at points of natural weak planes, such as at openings, juncture of dissimilar materials, and at re-entrant corners.
b. Locate joints in interior walls directly over building control and expansion joints.

c. Install control joints where partition abuts structural elements and dissimilar construction.
d. Locate joints in ceilings with undivided panel and where wings of "L", "U", and "T" shaped areas are joined. See "Installing Trim Accessories" in Part 3 of this section.
e. Locate joints in interior partitions and walls without openings. Do not exceed maximum spacing between joints as indicated in "Installing Trim Accessories" in Part 3 of this section.

G. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Fit gypsum panels around ducts, pipes, and conduits and install required sealant.
2. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

H. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

I. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

1. Space screws a maximum of 12 inches o.c. vertically, typical.
2. Space screws at tile backing boards a maximum of 8" o.c. vertically.

J. Sound Control Partitions: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

1. Install acoustical putty sheet products at electrical device boxes, ductwork and any other penetration locations that require an acoustical seal.

a. At electrical device boxes, install on rear and all four sides of the box per manufacturer's instructions.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws**.**

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

A. Control Joints: Install control joints according to ASTM C 840**,** at locations indicated on Drawings and in specific locations approved by Architect for visual effect. All required locations will not be shown on the drawings. See the following for additional required locations.

1. The following conditions or locations are a list of, but not inclusive of all, control joint locations:

a. Wall or partition that is an uninterrupted straight plane exceeding 30 feet.
b. Where a wall or ceiling traverses a construction joint (expansion, seismic or building control element) in the base buildings structure.

c. Interior ceilings with perimeter relief at 50 feet intervals with areas between not exceeding 2,500 square feet.
d. Interior ceilings without perimeter relief at 30 feet intervals with areas between not exceeding 900 square feet.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. L-Bead: Use where edge trim can only be installed after panels are installed.
3. Curved-Edge Cornerbead: Use at curved openings.

C. Aluminum Trim: Install in locations indicated on Drawings.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

1. Existing gypsum board surfaces where wall coverings have been removed are to be clean and free of remaining paste or adhesives and finished to Level 4.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound rated assemblies.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

a. Primer and its application to surfaces are specified in Division 09 “Interior Painting”.

5. Level 5: Where indicated on Drawings.

a. Primer and its application to surfaces are specified in Division 09 “Interior Painting”.

E. For Level 1 gypsum board, embed tape in joint compound. Tape and fastener heads need not be covered with joint compound.

F. For Level 2 gypsum board, embed tape in joint compound and cover tape, trim and fasteners with one coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

G. For Level 4 gypsum board, perform level 2 work and then apply two separate coats of joint compound on all joints, trim and fastener. Sand between all coats and after last coat. Surface shall be smooth and free of all visual defects.

H. For Level 5 gypsum board, perform level 4 work and then a thin skim coat of joint compound shall be trowel applied over the entire surface (leaving a skim coating of compound completely covering the paper surface).

1. As an alternative to a skim coat, an approved special surface primer may be applied.
2. Final surface must be smooth and free of all defects.

I. Water-Resistant Gypsum Backing Board: Finish according to manufacturer's written instructions.

J. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

K. Smoke Partitions: The intent of smoke partitions is for the wall to not have visible gaps. This includes terminations at the top and side, and at all penetrations.

1. At walls designated as smoke partitions, tape all joints above the ceiling to a Level 2 to eliminate all gaps.
2. Install tape/finishing compound or sealant at the perimeter of all penetrations.

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 095113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of 6-inch- square samples of each type, color, pattern, and texture.

Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc. or a comparable product by one of the following:

1. CertainTeed Corporation.
2. United States Gypsum Company.

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Acoustical Panel Type APC-1.

1. Product: Armstrong Ultima High NRC No. 2082.
2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

    a. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, with manufacturer's acoustically transparent membrane and factory applied latex paint.
    b. Pattern: E (lightly textured).

3. Color: White.
4. LR: Not less than 0.85.
5. NRC: Not less than 0.85.
6. CAC: Not less than 35.
7. Edge/Joint Detail: Beveled Tegular Reveal sized to fit flange of exposed suspension system members.
8. Thickness: 1 inch units.
9. Modular Size: 24 by 24 inches.
10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
11. Suspension System: Type MSS-1.

D. Acoustical Panel Type APC-2.

1. Product: Armstrong Calla, No. 2824MLG.
2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

    a. Type and Form: Type A, Form A2.2.
    b. Pattern: G (smooth textured).

3. Color: Light Grey.
4. LR: NA.
5. NRC: Not less than 0.85.
6. CAC: Not less than 35.
7. Edge/Joint Detail: Square Tegular sized to fit flange of exposed suspension system members.
8. Thickness: 1 inch.
9. Modular Size: 24 by 24 inches.
10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
11. Suspension System: Type MSS-1.

E. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 METAL SUSPENSION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc. or a comparable product by one of the following:

1. CertainTeed Corporation.

2. Chicago Metallic by Rockfon.
3. United States Gypsum Company.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.

C. Metal Suspension System, Type MSS-1.

1. Product: Armstrong Suprafine XL 9/16 inch.
2. Narrow-Face, Steel-Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished, cold-rolled, 9/16-inch- wide metal caps on flanges.

a. Structural Classification: Intermediate or Heavy-duty system.
b. End Condition of Cross Runners: Butt-edge type.
c. Face Design: Flat, flush.
d. Cap Material: Steel.
e. Cap Finish:

1) APC-1: Painted white
2) APC-2: Painted light grey

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

C. Hold-Down Clips: Manufacturer’s standard hold-down.

D. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Acoustical Panel Perimeter Trim:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Axiom Classic Trim or a comparable product by one of the following:

1) USG Interiors, Inc.; Compasso Elite.
2) Chicago Metallic by Rockfon. Infinity Standard Perimeter Trim
3) Gordan, Inc.; Contura Standard.

b. Sizes:

1) 2” high straight #AX2STR.

c. Color: Light Grey

2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079200 “Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and

other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636/C636M seismic design requirements**,** and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members. Provide supplemental framing as required if structural members are spaced too far apart.

10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 095434

ACOUSTICAL BAFFLE & PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:

1. Acoustic baffles with suspension system.

B. Related Sections:

1. Division 09 Section, "Non-Structural Metal Framing" for suspension of acoustical baffles.
2. Division 09 Section, "Acoustical Panel Ceilings" for ceilings consisting of mineral-base acoustical panels.

1.3 DEFINITIONS

A. LR: Light Reflectance Coefficient.

B. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Maintenance Data: For finishes to include in Maintenance Manuals.

C. Shop Drawings:

1. Include plans, elevations, sections, details and installation system details.
2. Include details at ceiling attachment.
3. Include details at cutouts and penetrations for other work.
4. Include quantities of each different type of cut acoustical baffles shape and locations on plan.

D. Samples for Verification:

1. Acoustical Baffle: 12-inch square
2. Acoustical Baffle attachments and accessories – one set.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide baffles and method of attachment and suspension system by a single manufacturer.

B. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

C. Fire-Test-Response Characteristics: Provide acoustical baffle ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical baffle ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Revise first subparagraph below if only assemblies tested by one or more specifically named testing and inspecting agencies are acceptable. Indicate rating, testing agency, and testing agency's design designation on Drawings.
3. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
4. Identify materials with appropriate markings of applicable testing and inspecting agency.
5. Surface-Burning Characteristics: Provide acoustical baffles with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store the metal suspension system and baffles in an interior location and keep in cartons prior to installation to avoid damage.

B. Exercise care in moving and opening cartons to prevent damage to the acoustical baffle face.

C. Handle acoustical baffles carefully to avoid damaging units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

1. Building areas to receive baffles shall be free of construction dust and debris.
2. Products can be installed at 80 degrees F (27 degrees C) with humidity not below 35% RH and not exceeding 55% RH.
3. Do not install where standing water is present or where moisture will come in direct contact with the canopy.
4. Following installation, conditions must be maintained below 70% RH. All wet work must be complete and dry prior to installation.
5. Avoid direct exposure of acoustical baffles to sunlight.
6. Installation shall be carried out where the temperature is between 60 degrees F and 80 degrees F.

7. These temperature conditions must be maintained throughout the life of the product or warranty will be void.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical baffles and suspension system with other construction that penetrates ceilings, including light fixtures, HVAC, and fire supression system.

1.9 WARRANTY

A. Acoustical Baffles: Submit a written warranty executed by the manufacturer, agreeing to repair or replace baffles that fail within the warranty period. Failures include, but are not limited to:

1. Baffles: Manufacturing defects.
2. Attachment devices: Rusting and manufacturing defects.

C. Warranty:

1. Manufacturer's products and attachment devices are expressly warranted for a period of twenty (20) years from purchase to be free from defects in material and workmanship, when installed according to manufacturer's published installation procedures. During the warranty period manufacturer will repair or at its option replace the products that are proven to be defective.

PART 2 - PRODUCTS

2.1 ACOUSTICAL BAFFLE

A. Basis of Design Product: Subject to compliance with the requirements, provide baffle products by one of the following manufacturers in locations:

1. Location: Libray Space L201:

a. Manufacturers:

1) Acoufelt: Veriform Premier

b. Dimensions: Curve lengths per drawings upto 110 inches length.
c. Height: 6 inch
d. Thickness: 2 inch minimum
e. Acoustical baffles to be mounted two (3) inches below finished acoustical panel ceiling from acoustical panel ceiling above.
f. Configurations: Baffle curve runs and module layouts shown in reflected ceiling plan. Refer to drawings for locations.
g. Material: Felt (100 percent polyster), 60 percent recycled content.
h. Edge Detail: Square edges.
i. Color:

1) APB-1: Platinum PL04
2) APB-2: Slate SL27

j. Sound Absorption: NRC 1.65 minimum.

k. Install Method: To be suspended from acoustical panel ceiling utilizing aircraft grade cable, twist lock attached to T-grid, and cable gripper assembly.

2.2 METAL SUSPENSION SYSTEM

A. Basis of Design Product: Subject to compliance with manufacturer's written instructions provide metal suspension accessories for suspended acoustical baffle products if required.

2.2 ATTACHMENT SYSTEM

A. Installation Hardware:

1. The systems will be designed to receive threaded cable assemblies or stainless steel wire rope via cable gripper and twist lock, provided by contractor. Threaded cable or stainless steel wire rope shall be attached to acoustical panel ceiling in accordance with structurally engineered design.

a. Hardware spacing to be 24 inches on center spacing on each baffle.

B. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.

1. Manufacturers: Subject to compliance with requirements, provide products by, but not limited to, one of the following:

a. Lexco Cable.
b. Loos & Co. Inc.
c. Suncor Stainless, Inc.

2. Size: Wire rope sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than minimum 1 x 19 wire rope, 1/8" diameter.

3. Wire Rope Fittings: Stainless steel couplers and connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

a. Properly sized machine swage sleeves can be used where wire rope connections are not visible.
b. Mechanical swage receivers (swageless) sized for wire rope size are to be used at exposed locations, where wire rope attaches to overhead structure or framing. Receiver to have bolt, wood stud or other connecting attachment as part of the unit.

PART 3 - EXECUTION

3.1 PREPARATION

A. Field verify ceiling area and establish layout of ceiling baffle models and attachment locations. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation. Ceiling baffle substructure shall be level and plumb. Ceiling panel substructure shall be structurally sound as determined by that subcontractor's engineer. Ceiling panel substructure shall be free of defects detrimental to work and erected in accordance with established building tolerances.

B. Coordinate ceiling baffle layout with mechanical, electrical and sprinkler fixtures as required.

C. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Install baffles in accordance with the manufacturer's instructions and in compliance with the authorities having jurisdiction.

B. Erect ceiling baffles level and plumb, in proper alignment in relation to substructure framing and established lines.

C. Baffle anchorage shall be structurally sound and per engineering recommendations.

D. Locate and place ceiling baffles level, plumb, and at indicated alignment with adjacent work.

E. At locations where ceiling suspension wires are exposed, use stainless steel wire rope. Secure roping to ceiling suspension members and to supports with machine swaged sleeve connections. Suspend wire rope with swageless receivers from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs.

3.3 ADJUSTING AND CLEANING

A. Replace damaged and broken baffles.

B. Clean exposed surfaces of ceiling baffles modules that are not protected by temporary covering to remove fingerprints and soil during construction period.

C. Protect ceiling baffles module assemblies from damage during construction. Use temporary protective coverings where needed as approved by the ceiling baffle manufacturer.

END OF SECTION

SECTION 096813

TILE CARPETING

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:

1. Modular carpet tile.

B. Related Sections include the following:

1. Division 02 Section "Selective Structure Demolition" for removing existing floor coverings.
2. Division 09 Section “Floor Preparation” for concrete testing, substrate preparation, condition requirements and installation of trowelable underlayments at all locations to receive tile carpeting.
3. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETING

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.4 SUBMITTALS

A. Product Data: For each type of product:

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Existing flooring materials to be removed.
3. Carpet tile type, color, and dye lot.
4. Type of subfloor.
5. Type of installation.
6. Pattern type, location, and direction.
7. Type, color, and location of insets and borders.

C. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

D. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

E. Sample Warranty: For special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Carpet and Rug Institute's CRI 104, Section 4.0, "Storage and Handling."

1.7 FIELD CONDITIONS

A. Comply with Carpet and Rug Institute's CRI 104, Section 7.0, "Site Conditions" for temperature, humidity and ventilation limitations.

B. Environmental Limitations: Do not install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.8 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to the following:

a. More than 10 percent edge raveling, snags, runs,
b. Dimensional stability.

c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed on the drawings.

B. Carpet Tile CPT-3, CPT-4, CPT-5, CPT-6 and CPT-8:

1. Manufacturer/Product Name: See drawings.
2. Color and Pattern: See drawings.
3. Fiber Content: 100 percent nylon 6,6.
4. Pile Characteristic: Tufted textured loop pile.
5. Primary Backing/Backcoating: Manufacturer's standard composite materials.
6. Secondary Backing: PVC-Free WellBAC™ Cushion
7. Size: See Drawings.
8. Applied Soil-Resistance Treatment: Manufacturer's standard treatment.
9. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet as follows:

a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.

10. Performance Characteristics: As follows:

a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm (Class I) per ASTM E648.
b. Dry Breaking Strength: Not less than 100 lbf per ASTM D 2646.
c. Tuft Bind: Not less than 6.2 lbf per ASTM D 1335.
d. Delamination: Not less than 3.5 lbf/in. per ASTM D 3936.
e. Dimensional Stability: 0.2 percent or less per ISO 2551 (Aachen Test).
f. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
g. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) per AATCC 16, Option E.
h. Electrostatic Propensity: Less than 3.5 kV per AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Underlayments: See Section 091001 Floor Preparation for Trowelable Underlayment products to be used for substrate preparation.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Refer to Part Three, Execution, for Absorption (Porosity) Testing. Assessment of test results is to determine floor finish manufactures recommended adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.

C. Examine carpet tile for type, color, pattern, and potential defects.

3.2 PREPARATION

A. General: Comply with Carpet and Rug Institute's CRI 104, Section 8.0, "Substrate Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Concrete Substrates: Concrete substrates are to be prepared, cleaned and tested per 091001 Floor Preparation.

1. Entire floor substrate is to have trowelable underlayment applied to produce a uniform and smooth substrate.

C. Tile Carpet Adhesion Bond Testing: After substrate preparation and underlayment application, test flooring for adhesion to substrate according to manufacturer’s written instructions and the following:

1. Bond test must be performed using the actual flooring and adhesive to be installed. Evaluate for bond strength to substrate to verify manufacturers requirements are met.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile Installation," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders unless shown otherwise on drawings.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with Carpet and Rug Institute's CRI 104, Section 13.7, “Post Installation."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 099123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete (vertical and overhead).
2. Concrete masonry units (CMU).
3. Steel.
4. Aluminum (not anodized or otherwise coated).
5. Gypsum board.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements provide paints by the Sherwin Williams Company or comparable products by the following:

1. Benjamin Moore & Co.
2. Pratt and Lambert.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.

2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI No. 310.2. Perform the following minimum preparation. Perform additional methods if the following does not produce the adequate profile and porosity.

a. Use floor buffing machine or power tool with 60 to 80 Grit pads for sanding concrete surfaces. Vacuum clean surfaces of materials removed by sanding.

E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.

F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Aluminum Substrates: Remove surface oxidation.

K. Wood Substrates (Paint):

1. Scrape and clean knots and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

L. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

1. Existing painted gypsum board substrates must be thoroughly cleaned to remove all dirt, oils and mold or mildew. Lightly sand surfaces after cleaning. Primer is to still be applied as part of the scheduled paint system.

M. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Electrical equipment that is indicated to have a factory-primed finish for field painting.
b. Electrical conduit that is surface mounted on painted walls.

E. Rated Wall Identification – When applicable all Fire Walls, Fire Barriers, Fire Partitions, Smoke Barriers and Smoke Partitions, as designated on the Life Safety Plans shall be labeled as follows:

1. Label type: Stencil.
2. Size: 4 inches high.
3. Location: 6 inches above ceiling every 10 feet on both sides of wall.
4. Content: Stencil shall designate type of wall and fire rating noted on Life Safety Plans (i.e. FIRE BARRIER – 1 Hr. or SMOKE BARRIER – 1 Hr.).
5. Label Color:

a. All Smoke Barriers: Blue.
b. All Fire Walls, Fire Barriers, Fire Partitions and Smoke Partitions: Red.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. Latex System (Standard for CMU walls):

a. Prime Coat: One coat Prep Rite Block Filler B25W25, 4 mils WFT/1.6 mils DFT.
b. Topcoats: Two coats Pro Mar 200 Latex Zero VOC eggshell, 4 mils WFT/1.6 mils DFT per coat.

B. Steel Substrates:

1. Prime Finish General Note: Manufacturer of products will typically have standard primer applied. Primer to be compatible to final coatings listed or match the listed primers.

a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2. Latex Over Acrylic Primer System: (Miscellaneous metal, metal doors and frames (including coated/galvannealed base metal), access doors and frames, metal light frames in wood doors and other):

a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series 6.5 mils WFT/2.5 mils DFT.
b. Topcoat: Two coats Pro Industrial Acrylic B66-650 Semi-Gloss, 2.5-4.0 mils DFT.

C. Aluminum Substrate (Not anodized or otherwise coated.):

1. Water Based, Light Industrial Coating System:

a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series, 6.5 mils WFT / 2.5 mils DFT.
b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eggshell, 6.5 mils WFT/2.5 mils DFT.

D. Wood Substrates (Dimension lumber, finish lumber, panel products):

1. Latex System:

a. Prime Coat: One coat Premium Wall & Wood Primer B28W8111, 1.8 mils DFT.
b. Topcoat: Two coats Pro Industrial Acrylic Semi-Gloss, 4 mils WFT/1.4 mils DFT per coat.

E. Gypsum Board and Plaster Substrates:

1. Latex System One (Standard for walls):

a. Prime Coat: One coat ProMar 200 Zero VOC Latex Primer, 4 mils WFT/1.3 mils DFT.
b. Topcoats: Two coats ProMar 200 Zero VOC Latex Eggshell. 4 mils WFT/1.6 mils DFT per coat.

2. Latex System Two (Standard for soffits and ceilings):

a. Prime Coat: One coat ProMar 200 Zero VOC latex Primer, 4 mils WFT/1.3 mils DFT.
b. Topcoats: Two coats Pro Mar 200 Zero VOC Latex Flat, 4 mils WFT/1.6 mils DFT per coat.

F. Wood Substrates Stain and Transparent Finishes:

1. Waterborne Clear Acrylic.

a. Two Finish coats: SW Minwax Water Based Oil-Modified Polyurethane, Satin, 4 mils WFT/1.7 mils DFT per coat.

END OF SECTION

SECTION 102600

WALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Corner guards.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Shop Drawings: For each type of wall protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.

C. Sample Warranty: For special warranty.

D. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

a. Store corner-guard covers in a vertical position.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall protection products from single source from single manufacturer.

B. Basis of Design: Subject to compliance with requirements, provide products by IPC Door and Wall Protection Systems; Division of InPro Corporation, or products by one of the following:

1. Construction Specialties, Inc.
2. Pawling Corporation
3. Manufacturers as listed for specific products

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.3 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards [CG-X]: Fabricated as one piece from formed metal with formed edges; with 90- degree wall condition or factory formed for 45 to 178- degree turn to match wall condition.

1. Model: Stainless Steel Corner Guard
2. Material: Stainless-steel sheet, Type 304.

a. Thickness: Minimum 0.0500 inch.
b. Height: As indicated on the drawings.
c. Finish: Directional satin, No. 4.

3. Wing Size: Nominal: 1-1/2 by 1-1/2 inches.
4. Corner Radius: 3/16 inch.
5. Mounting: Adhesive.

2.4 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required; thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D256, Test Method A.

C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

D. Adhesive: As recommended by protection product manufacturer.

2.5 FABRICATION

A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.6 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For wall protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
3. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

SECTION 23 01 00

GENERAL HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. Applicable codes, standards, and regulatory requirements. Install work in full accordance with rules and regulations of State, County, and City authorities having jurisdiction over the premises. This shall include all OSHA and State safety requirements.

B. All wiring shall comply with the current edition of the National Electrical Code, applicable State Code, applicable local code, and OSHA. In cases of conflict between code and specifications, the more restrictive requirements shall govern.

C. All equipment, materials, and installation methods shall comply with the following codes, where applicable:

1. International Building Code (IBC).
2. International Mechanical Code (IMC).
3. International Energy Conservation Code (IECC).
4. National Electrical Code (NEC).
5. National Fire Protection Association (NFPA).
6. Occupational Safety and Health Administration (OSHA).
7. Local authority having jurisdiction (AHJ) and any state accepted addenda to the adopted International Code Council publication.

D. All equipment, materials, and installation methods shall comply with the following standards, where applicable:

1. Air-Conditioning, Heating, and Refrigeration Institute (AHRI).
2. American National Standards Institute (ANSI).
3. ASTM International (ASTM).
4. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
5. American Society of Mechanical Engineers (ASME).
6. American Welding Society (AWS).
7. Fluid Sealing Association (FSA).
8. National Institute of Standards and Technology (NIST).
9. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
10. Underwriters Laboratories (UL).

1.2 DEFINITIONS

A. Inferred Phrases:

1. The word "provide" shall be understood to mean "furnish and install."
2. The word "set" shall be understood to mean "install."

B. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, and relays generally represent the types of equipment associated with motor control wiring. Motor control wiring is single phase and usually 120 volts. Where the motor power wiring exceeds 120 volts, a control transformer is used to provide a control voltage of 120 volts.

C. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve, or motorized valve, either modulating or two-position. This wiring shall be as required by the control system manufacturer, typically 24VAC. Refer to Section 23 09 00 for additional control wiring requirements related to DDC/BAS systems.

1.3 SCOPE OF WORK

A. This Specification and the associated drawings govern the furnishing, installing, testing, and placing the Mechanical Systems into satisfactory operation as verified by testing, adjusting, and balancing (Section 23 05 93) or commissioning activities.

B. Each Contractor shall provide all new materials indicated on the drawings and/or in these specifications, and all items required to make the portion of the Mechanical Work a finished and working system.

C. The scope of work shall include the furnishing of systems, equipment, and materials specified in this division and as called for on the drawings and on the schedules. Provide all materials, equipment, labor, and supervision necessary to install and perform all work described in this Section.

1.4 DOCUMENT INTERPRETATION AND GENERAL REQUIREMENTS

A. The drawings for the mechanical work are diagrammatic, intended to convey the scope of the work and to indicate the general arrangements, locations, and the approximate sizes of equipment.

B. The Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.

1. Scaling of the drawings alone is not sufficient or accurate for determining these locations.

C. Due to the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.

D. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.

E. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation will be considered applicable. In the event that such interferences occur in the course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the engineer with their final direction, confirmed in writing.

F. If an item is scheduled or noted on the drawings or in the specifications, it shall be included in the contract and project scope.

G. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules, and/or specifications, the greater number shall govern.

H. The Drawings and the Specifications are cooperative and supplementary. It is the intent of both said Drawings and Specifications to cover all mechanical requirements in their entirety as nearly as possible. This Contractor shall closely check the Drawings and Specifications for any obvious errors or omissions and bring any such condition to the attention of the Design Professional prior to the receipt of bids.

1.5 BASIS OF DESIGN EQUIPMENT

A. Where more than one manufacturer is listed in the Specifications as being acceptable, it shall be understood that the "basis of design" manufacturer is the manufacturer included in the equipment schedule or with the model number listed. Subject to project requirements, all other listed manufacturers are considered as acceptable alternatives.

B. If installation of an acceptable alternative alters the design, electrical, or space requirements indicated on the Drawings, this Contractor shall bear the costs for the revised design and construction including costs of all trades involved.

1.6 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the scheduled manufacturer is the basis for job design and establishes the quality required.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fit in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to, structural supports, electrical connections, piping and ductwork connections and arrangement, plumbing connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors.

C. Any material, article, or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article, or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer not later than ten (10) days prior to the bid opening.

D. This Contractor assumes all costs incurred as a result of using the offered material, article, or equipment, on the Contractor's part or on the part of other Contractors whose work is affected.

E. This Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder.

F. All material substitutions requested later than ten (10) days prior to bid opening must be listed as voluntary changes on the bid form.

1.7 OWNER-FURNISHED PRODUCTS

A. Any Owner furnished equipment and materials will be outlined on the drawings and schedules.

1. If not specifically noted as “owner furnished” or “save/salvage for relocation” assume equipment and materials will be new and provided by the contractor.

B. The Owner will supply manufacturer's installation data for any Owner-purchased equipment for this project.

C. This Contractor shall make all mechanical system connections shown on the drawings or as required for fully functional units.

D. This Contractor is responsible for all damage to Owner-furnished equipment caused during installation.

1.8 WORK SEQUENCE

A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours will be required.

1.9 SUBMITTALS

A. Submittals shall be required for equipment and specialty items furnished or provided by this Contractor, and for additional items where required elsewhere in the specifications or on the drawings.

B. General Submittal Procedures: In addition to the provisions of Division 01, the following are required:

1. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

a. Date.

b. Project title and number.

c. Architect/Engineer.

d. Contractor and subcontractors' names and addresses.

e. Supplier and manufacturer's names and addresses.

f. Division of work (e.g., plumbing, heating, ventilating, etc.).

1). Associated Specification Section

g. Description of item submitted (using project nomenclature) and relevant specification number.

h. Notations of deviations from the contract documents.

i. Other pertinent data.

j. Provide space for Contractor's review stamps.

2. Shop Drawing Content: Shop drawings shall contain the following information, where applicable:

a. General: Model number, dimensions, weight, clearance requirements, special rigging requirements, material, color and finish, installation recommendations, ratings, and all included options and accessories.

b. Performance: Performance data as scheduled and/or specified (at a minimum), code/standard compliance information, and pressure drop curve or chart.

c. Connections: All pipe and duct connections, including size(s), location(s), connection service (supply, return, exhaust, etc.), and connection method.

d. Electrical Connections: Location(s), termination lug size(s), and plug NEMA configuration.

e. Electrical: Characteristics including voltage/phase, full load and locked rotor amps, required overcurrent protection and short circuit interrupting capacity, horsepower of motor(s), power wiring diagram, and accessories furnished including starter(s), disconnect(s), and on/off switches. Clearly indicate if accessories are factory or field mounted/wired.

f. Controls: Wiring terminations for required interlock and control wiring, wiring diagram with factory-installed and field-installed portions clearly differentiated, accessories furnished including thermostat(s) and sensor(s), sequences of

operation, and integration protocol(s) including baud rate, available points with read/write capabilities clearly noted, and registers required for integration.

g. Dimensions data including, equipment dimensions, shipping and operating weights; shipping splits; service clearances.

h. All fabrication details including erection, layout, and setting drawings.

3. Contractor's Approval Stamp:

a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date, and sign each submittal certifying it has been reviewed.

b. Unstamped submittals will be rejected.

c. The Contractor shall review, stamp, and approve all subcontractors' submittals as described above.

d. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

4. Schedule submittals to expedite the project. Coordinate submission of related items.

5. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.

6. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.

7. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If a submittal requires more than one resubmission due to Contractor errors or omissions, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.

8. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.

9. Contractor's responsibility for errors, omissions, or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.

10. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

11. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.

2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable.

4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
    a. Submittal file name: 23 XX XX.description.YYYYMMDD.
    b. Transmittal file name: 23 XX XX.description.YYYYMMDD.
5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

D. Engineer's Review: Shop drawings shall be reviewed only for general compliance and not for dimensions or quantities. The Reviewer will make reasonable efforts to detect and correct errors, omissions, and inaccuracies but shall not be responsible for failure to detect errors, omissions, or inaccuracies. The Engineer shall mark the shop drawings in one of the following ways:

1. Approved: The submittal complies with the requirements of the specifications.
2. Approved as Noted: The submittal generally complies with the requirements of the specifications but some non-critical items which need to be corrected/coordinated are noted. Corrections shall be changed on the shop drawings submitted for inclusion in the Operations and Maintenance Manual. Resubmittal is not required unless noted otherwise.
3. Revise and Resubmit: The submittal generally complies with the requirements of the specifications but some critical items which need to be corrected/coordinated are noted. The submittal must be revised and resubmitted with all comments addressed.
4. Rejected: The submittal does not comply with the requirements of the specifications. The submittal must be revised and resubmitted.
5. Approval of submittal items shall not eliminate the Engineer's right to reject those items if defects are discovered prior to final acceptance of the completed work.

1.10 QUALITY ASSURANCE

A. Contractor's Responsibility for Document Review:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation.
2. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
3. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.

B. Qualifications:

1. Only products of reputable manufacturers are acceptable. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of equipment, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
2. All Contractors and subcontractors shall employ only workers skilled in their trades.

C. Equipment and Materials:

1. When two or more items of the same equipment type are required (pumps, fans, valves, etc.) they shall be of the same manufacturer.
2. All equipment and materials shall be new.
3. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Compliance with Codes, Laws, and Ordinances:

1. Conform to all requirements of the Local AHJ, Laws, Ordinances, and other regulations having jurisdiction.
2. Conform to all published standards of the owner.
3. Conform to all State Codes.
4. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
5. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
6. All changes to the system made after letting of the contract, to comply with codes or requirements of Inspectors, shall be made by the Contractor without cost to the Owner.
7. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
8. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

1.11 PERMITS, FEES, TAXES, AND INSPECTIONS

A. Procure all applicable permits and licenses.

B. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.

C. Pay all charges for permits or licenses.

D. Pay all fees and taxes imposed by the State, Municipal, and/or other regulatory bodies.

E. Pay all charges arising out of required inspections by an authorized body.

F. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.

G. Where applicable, all fixtures, equipment, and materials shall be listed by Underwriters Laboratories, Inc

1.12 EQUIPMENT SUPPLIERS' INSPECTION

A. Contractor shall arrange for and obtain supplier's on-site inspection(s) at proper time(s) to assure each phase of equipment installation and/or connection is in accordance with the manufacturer's instructions.

B. Submit copies of start-up reports to the Architect/Engineer and include copies in the Owner's Operation and Maintenance Manuals.

1.13 PRODUCT DELIVERY, STORAGE, HANDLING, AND MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage. Keep materials clean, dry, and free from harmful conditions. Immediately remove any materials that become wet or that are suspected of becoming contaminated with mold or other organisms.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment.

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage, humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all bearings properly lubricated and all belts properly tensioned and aligned.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, they shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

G. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

H. Handle equipment and components carefully to prevent damage, breaking, denting, and scoring. Do not install damaged equipment or components; replace with new.

I. Comply with manufacturer's rigging and installation instructions for unloading equipment and moving them to final location.

J. The arrival and placing of large equipment items shall be scheduled early enough to permit entry and setting when there is no restriction or problem due to size and weight.

1.14 COORDINATION AND SUPERVISION

A. This Contractor shall examine the work of other trades and shall so coordinate and schedule work as not to cause delays or interference with work of others.

B. Coordinate structural openings and the setting of sleeves with other trades, to accomplish the installation of equipment, ductwork, and piping with minimal cutting through concrete or masonry.

C. Coordinate the installation of all required supporting devices, inserts, and hangers in structural components as they are constructed.

D. Install HVAC equipment and components (valves, dampers, etc.) to facilitate servicing, maintenance, and repair or replacement. Coordinate the final location of concealed equipment and components requiring access with the final location of access doors and panels. Allow adequate space for proper servicing, maintenance, and repair. Make final connections to equipment with consideration for future disconnection and removal with minimal interference with other installations.

E. Where installation is to occur in an area with no ceiling and mounting heights are not detailed or dimensioned on the Drawings, install equipment components and systems to provide maximum possible headroom.

F. Install additional piping and ductwork offsets as required to obtain maximum headroom or to avoid conflicts with other work, without additional cost to the Owner.

G. Before installing work, report any interferences between work of this Division and work of other Divisions to the Architect as soon as they are discovered.

H. Ceiling grid systems shall not be supported from equipment, ductwork, or piping and vice versa. Where interferences occur, trapeze type hangers or supports shall be employed which shall be located so as not to interfere with access to HVAC equipment such as valves, dampers, etc.

I. Provide adequate competent supervision at all times when work is being performed. Cooperate with all other trades to avoid interferences and delays.

1.15 ELECTRONIC MEDIA/FILES

A. Construction drawings for this project have been prepared utilizing Revit.

B. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.

C. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.

D. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.

E. The drawings for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.

F. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.

G. The information is provided to expedite the project and assist the Contractor with no guarantee as to the accuracy or correctness of the information provided.

1.16 WEB-BASED PROJECT SOFTWARE

A. If a web-based project software site for the purpose of hosting and managing project communication and documentation is utilized, provide user licenses for use by the Engineer for accessing and reviewing construction documents as required by the project.

1.17 WARRANTY

A. Provide one-year warranty, unless otherwise noted, to the Owner for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this Division of the specifications shall commence on the date of final acceptance, unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system, or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements shall extend to correction, without cost to the Owner, of all Work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from defects or nonconformance with contract documents.

D. All work found to be defective will be replaced with new work meeting all the requirements of the Contract. This Contractor will bear all costs of supplying such new work, and installing and finishing same, and will assume all costs for replacing other work damaged by the removal and replacement of any of the work.

E. Include copies of all warranties in the operation and maintenance manuals.

F. Extended warranties for specific equipment components (e.g., compressors, heat exchangers) shall be as specified in the applicable equipment specification section..

1.18 INSURANCE

A. Contractor shall maintain insurance coverage as set forth in Division 00 and 01.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Refer to General Conditions and Division 01 for full contractor jobsite safety responsibilities.

B. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties, and responsibilities.

C. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions.

D. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

E. Provide a fire watch during construction hot work activities and continue for a minimum of 30 minutes after the conclusion of the work, unless there are no fire hazards or combustibles.

F.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Examine areas and conditions where equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install equipment as indicated, and in accordance with manufacturer's installation instructions. Uncrate units and inspect for damage. Verify that nameplate data corresponds with unit designation.

C. Locate equipment, plumb and level, firmly anchored in locations indicated. Coordinate with other trades to assure correct recess size for recessed units. Hang ceiling units from building substrate, not from piping. Support units with rod-type hangers anchored to building substrate.

D. All equipment shall be installed with adequate clearance provided for routine maintenance and servicing. Locate horizontal, above-ceiling units to maintain access with ceiling components below.

E. Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

F. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 Sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.3 FIELD MEASUREMENTS

A. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes, or ducts.

3.4 MECHANICAL DEMOLITION AND SALVAGE

A. Active Services: When encountered, support active mechanical services as necessary. If active services require relocation (other than those indicated on the drawings), obtain written instructions before proceeding. Do not disturb active services scheduled to remain.

B. Inactive or Abandoned Services: When encountered, remove inactive and abandoned ductwork and piping full length. Removal shall include all hangers and supports. Notify servicing utility when encountered outside of structure.

C. General Demolition Work:

1. Remove or relocate those mechanical services specifically indicated on the drawings and as required to complete demolition work.

2. Remove all existing mechanical equipment, piping, ductwork, devices, controls, and wiring in remodeled areas that interfere with new construction and are not necessary to maintain services that are to remain.

3. Relocate, or extend as required, mechanical equipment, piping, ductwork, devices, and wiring that interfere with new construction and are essential to maintain service to equipment and devices that are to remain.

4. All piping and ductwork and wiring to be removed shall be removed full length back to the active source.

5. All holes or damage caused by the removal of existing work shall be properly patched. Holes shall be neatly patched with suitable materials to match existing surfaces.

D. Safe Disposal of Hazardous Materials:

1. Mechanical Contractor shall safely dispose of all hazardous materials generated by or encountered during mechanical demolition activities under this Division in full compliance with all Federal, State, and EPA regulations.

2. Mechanical Contractor shall identify installed facilities requiring removal or modification that are suspected to contain asbestos insulation. If suspicious insulation is encountered, the Mechanical Contractor will cease demolition and shall notify the Owner.

3. The Mechanical Contractor shall not be responsible for removal of asbestos insulation.

    a. The Mechanical Contractor shall work with the Owner's asbestos removal and abatement contractor to prioritize abatement work and develop a schedule for removal of hazardous materials to minimize revisions to the contractual timeframe.

E. Salvage:

1. Mechanical equipment, piping, and devices that are to be removed shall be offered to the Owner for salvage. Salvaged equipment, piping, and devices shall be stored on the site at areas designated by the Owner.

2. Items not selected for salvage by the Owner shall become the property of the Mechanical Contractor and shall be removed from the site by the Mechanical Contractor.

3.5 MECHANICAL SYSTEM SHUTDOWNS

A. General:

1. The Contractor shall work with the Owner to schedule and plan required system shutdowns. The Contractor shall identify all necessary shutdowns and shall identify the duration and approximate date(s) shutdowns will be required at the outset of the project.

2. The Owner shall reserve the right to dictate final time and date of all shutdowns. The Contractor shall perform all shutdowns at the time and date as directed by the Owner, even if they are required to be performed on weekends or after normal business hours.

3. The Contractor shall work with the Owner's personnel to identify strategies to isolate portions of existing systems required to remain active from targeted portions of systems to be made inactive. Should isolation devices not be present, or not be functional, the Owner shall be notified of the deficiency. In any case, the shutdown shall still be required and deficiencies of the existing system shall be corrected or worked around. Correcting deficiencies not identified herein or on the drawings shall be considered an unforeseen existing condition, and any incurred cost shall not be the responsibility of this Contractor to absorb.

3.6 HYDRONIC PIPING SYSTEMS FLUSHING AND TESTING

A. Codes and Standards:

1. All mechanical piping systems shall be tested in accordance with the Local Mechanical Code.

2. All pressure piping systems shall be tested in accordance with applicable State pressure piping system rules.

B. Inspections:

1. Obtain all piping inspections required by the authorities having jurisdiction over the premises. Furnish all certificates of such inspections and include in the Operating and Maintenance Manuals. Pay all fees necessary for the inspections.

2. No part of system shall be covered before inspection is made and approved. If covered before test, Contractor shall pay for cost of uncovering so test can be made and accepted.

C. Testing - General:

1. See each specific piping system specification section of Division 23 for applicable test and specific testing requirements.
2. Perform piping system pressure tests to all new piping systems prior to final connections to equipment and prior to connection to existing building piping. If equipment is connected, it shall be isolated from the system during the test.
3. Perform all tests before piping is concealed, insulated, or heat traced.
4. Contractor is responsible for completely draining the systems after hydrostatic tests are performed. Any damage from freezing prior to acceptance of the completed installation shall be repaired at no additional cost to the Owner.
5. Correct minor leaks in welded joints by chipping out weld and re-welding. Correct leaks in screwed joints by replacing thread or fitting or both. Caulking of threaded joints is not permitted. Repair leaks in copper pipe by sweating out joints, thoroughly cleaning both pipe and fitting, and re-soldering.
6. Contractor is responsible for providing all equipment, power, and labor necessary for performing all required inspections and tests.
7. Pressure tests shall be witnessed by Owner's representative.

D. Hydronic Systems: Each heating water, chilled water, tower water, and heat pump closed loop system shall be tested as a whole system or in sections, such that no part of the complete system is left untested. Testing shall comply with ASME B31.9 and the applicable local mechanical code.

Medium	Pressure	Duration	Requirements
Water	1.5 times maximum system design pressure, 100 psi min	6 hours	No appreciable pressure loss

1. For systems requiring glycol solution, hydronic piping shall be flushed with clean water and tested prior to the introduction of glycol. Glycol shall be introduced only after successful completion of the hydrostatic test and with the Architect/Engineer's approval.

3.7 EQUIPMENT AND SYSTEM START-UP

A. Schedule:

1. Coordinate schedule for start-up, testing, and adjustments of various equipment and systems with the Architect, other contractors, and Owner.
2. Contact all parties, including the Architect, required to witness equipment start-up as indicated in each equipment and system specification section of this division. Contractor shall give at least two (2) weeks' notice to all parties of scheduled start-up date and time.

B. Examination: Prior to start-up, verify the following:

1. That each piece of equipment or system is supported properly.
2. That each piece of equipment or system has been checked for proper lubrication, wiring, drive rotation, belt tension, belt alignment, shaft alignment, control sequence, or other conditions which may cause damage.
3. Check vibration isolation devices to verify spring locks have been removed and vibration isolators are unconstrained.
4. That all tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system.

5. Check equipment containing a separately coupled motor for proper motor and shaft alignment.

C. Lubrication and Packing:

1. Properly lubricate all rotating or reciprocating equipment before it is started with correct grade, type, and quantity of lubricant as recommended by manufacturer.

2. Check each shaft containing a packing gland condition by backing packing gland off and examining for proper grade, amount, and type of packing as recommended by manufacturer.

3. Maintain all lubrication, gaskets, and packing during construction. Assure that at the time of final project acceptance all are in first-class condition.

D. Correction of Deficiencies: Any conditions found to be unsatisfactory to the standards outlined by the manufacturer or these specifications during the pre-start-up examination process shall be corrected prior to actual start-up of equipment and systems.

E. Equipment and System Start-Up:

1. Follow manufacturer's recommendations and requirements for start-up of equipment.

2. Document date of equipment start-up for commencement of manufacturer's warranty.

3. If required by the specific equipment or system specification section, provide factory-authorized personnel present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

4. Submit a written report that equipment or system has been properly installed and is functioning correctly.

5. During the start-up, testing, or adjustment period, maintain on the project a contractor representative thoroughly familiar with all phases of the project for as long a period as required to start up all equipment and systems and demonstrate that they are functioning properly.

6. Contractor is responsible for furnishing any and all instruments required to start up and test equipment or systems which include thermometers, electric meters, pressure gauges, etc.

F. Adjustments:

1. Contractor shall make adjustments, if required, to equipment and systems after starting them up and observing them operate for a sustained period of time. Corrections shall be made if systems are excessively noisy or vibrating excessively.

2. The Engineer or his representative may make spot checks to determine the accuracy and completeness of final adjustments. Should spot checks indicate more than a reasonable deviation from design requirements, the Contractor shall repeat tests and adjustments to the satisfaction of the Engineer.

3. Contractor shall adjust the mechanical systems and controls at season changes during the one-year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.

3.8 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign rubbish, paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment and the premises.

B. Clean all drain pans and areas where moisture is present. Immediately report any mold, biological growth, or water damage.

C. Remove all rust, scale, dirt, oils, stickers and thoroughly clean exterior of all exposed bare metal ductwork, piping, hangers, and accessories.

D. Retouch any marred or scratched surfaces of factory finish, using finish materials furnished by the manufacturer.

E. If air handling equipment is approved for use to provide temporary service, do not operate without proper filtration. Filters shall be installed at the inlets of all return air ductwork and the inside surface shall be cleaned prior to project turnover. Replace all filters used during construction with proper system filters prior to project turnover.

3.9 PROTECTION OF WORK AND PROPERTY

A. The Contractor shall be responsible for safeguarding work, property, and facilities against damage, from contractors own personnel as well as others, with which they may come into contact in the performance of their work.

B. Stored materials shall be protected against damage from weather. Pipe and duct openings shall be closed with caps or plugs during installation. All equipment shall be covered and protected from damage. Any materials or equipment damaged at any stage in the construction shall be replaced or repaired and shall be in a clean, unblemished condition at project turnover.

C. Protect floors and walls against staining and abrasion from chips and cutting oil where pipe cutting and threading machines are used.

D. Protect equipment and finished surfaces from welding, soldering, brazing, and burning with baffles and blankets.

E. Use drop cloths to protect finished surfaces from paint and insulation adhesive droppings.

F. Assume responsibility for any damage caused by leaks in any piping system being installed or reworked under this Contract. Repair all damage without extra cost to Owner. Restore building, piping, insulation, etc. to their original condition.

G. The Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during the warranty period.

H. Contractor shall restore all landscaping, building finishes, envelopes, etc. To their previous condition upon completion of work. Provide before-and-after photographs to demonstrate compliance

I. Contractor shall coordinate special roofing protection requirements with roofer. (i.e. Pads, braces, coverings, etc.)

1. Contractor shall ensure all foot traffic and work on roof includes adequate protective measures and avoids introducing hazardous debris to the roof. (i.e. Metals rods, screws, sheets, etc.)

J.

3.10 IAQ FOR OCCUPIED FACILITIES

A. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building.

1. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:

a. Minimizing the amount of dust generated.

b. Reducing solvent fumes and VOC emissions.

c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.

d. Protect stored on-site and installed absorptive materials from moisture damage.

2. Request copies of and follow all of the Owner's IAQ and infection control policies. Request that the Owner designate an IAQ representative.

3. Review and receive approval from the Owner's IAQ representative for all IAQ-related construction activities and negative pressure containment plans.

4. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.

5. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.

6. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.

7. In addition to the criteria above, provide measures as recommended in the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction."

8. If permanently installed air handlers are used to serve both construction and occupied areas, all return grilles throughout construction areas shall be sealed to prevent air from construction areas being supplied to occupied areas.

3.11 DUCTWORK CLEANLINESS DURING CONSTRUCTION

A. Throughout the duration of construction, all ductwork shall be capped or sealed with sheet metal caps, polyethylene film, or other airtight protective to keep dust, dirt, and construction debris out of ducts. Similar means shall be used to seal air-side connections of HVAC equipment to include, but not limited to, air handling units, fans, terminal air boxes, fan coil units, cabinet heaters, blower coils, and the like.

B. When air terminal devices are installed, contractors shall seal all supply, return, and exhaust grilles with polyethylene film or other airtight protective to keep dust, dirt, and construction debris out of ducts.

C. Should HVAC equipment be started during construction, Contractor shall remove airtight protectives and shall install one-inch thick MERV 8 filter media over all return and exhaust grilles to prevent dust, dirt, and construction debris from entering ductwork. Filter media shall cover the entire grille face and shall be secured such that air cannot bypass filter media.

D. Should filter media become laden with dust and dirt, Contractor shall replace filter media with new media to prevent damage to air distribution system and equipment.

E. The following steps shall be taken during testing, adjusting, and balancing of each air system:

1. All construction activities in all spaces served by the air system shall stop.

2. All airtight protectives and temporary filter media shall be removed from all portions of the air system.

3. Testing, adjusting, and balancing work shall not commence until all construction activity is stopped and all airtight protectives and temporary filter media is removed.

4. Once testing, adjusting, and balancing work is complete for the air system, airtight protectives or temporary filter media shall be installed over all ductwork openings and air terminals on the air system prior to resuming construction activities in any spaces served by the air system.

F. The Owner shall agree the building is sufficiently clean prior to the removal of any filtration media and airtight protectives from air terminal devices.

3.12 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval.

a. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.

2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least ten (10) days prior to instruction of operating personnel.

B. Manual Format and Submittal:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.

2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.

3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected.

a. If requested by the owner provide a hard copy set. Include all materials in a three (3) ring binder or binders, if volume of content dictates multiple books.

4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted.

a. O&M file name: O&M.div23.contractor.YYYYMMDD.

b. Transmittal file name: O&Mtransmittal.div23.contractor.YYYYMMDD.

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

6. Provide the Owner with an approved copy of the O&M manual though file transfer or on flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions," title of the project and subject matter.

7. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment, and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses, and points of contact. Website URLs and email addresses shall be active links in the electronic submittal.

2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.

3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Refer to Section 23 09 00 for additional requirements for Temperature Control submittals.
5. Copy of final approved test and balance reports.
6. Copies of all factory inspections and/or equipment startup reports.
7. Copies of warranties.
8. Schematic electrical power/controls wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
9. Dimensional drawings of equipment.
10. Operating procedures for each system.
11. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
12. Repair procedures for major components.
13. List of lubricants in all equipment and recommended frequency of lubrication.
14. Instruction books, cards, and manuals furnished with the equipment.

D. Warranty Documentation:

1. Contractor warranty including date of final acceptance (this indicates the start of the warranty period).
2. Date of final acceptance shall be issued by the Architect.

E. Provide Operations and Maintenance Manuals to Owner and Engineer in PDF format.

3.13 OWNER OPERATING MAINTENANCE TRAINING

A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.

B. Provide verbal and written instructions to the Owner's representatives by factory personnel in the care, maintenance, and operation of the equipment and systems.

C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

D. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can attend if desired.

1. Minimum hours of instruction for each item shall be outlined within individual Division 23 Specifications.

E. Training Requirements shall include but not be limited to:

1. Demonstrate equipment access and maintenance requirements.
2. Explanation of all system flow diagrams.
3. Explanation of seasonal system changes.
4. Point out the actual location of each component of a system and demonstrate its function and its relationship to other components within the system.

5. Demonstrate each system by actual "start-stop" operation showing how to work controls, how to reset protective devices, how to replace components requiring regular maintenance, and what to do in an emergency.
6. Demonstrate communication, signal, alarm, and detection systems by actual operation of the systems and show how to reset signal, alarm, and detection devices.

F. Schedule and Agenda:

1. Submit a schedule of training events, including proposed date, starting time, and ending time of each training session to the Architect/Engineer, Commissioning Agent, and Owner prior to the completion of construction for review and approval.
2. Equipment and systems requiring a training session are indicated in each equipment and/or system's dedicated specification section.
3. Indicate required attendees and proposed trainers required for each training session with the event schedule.
4. Operation and maintenance manuals shall be provided to the Owner at least fourteen (14) days prior to the first training session.
5. Submit to the Architect a sign-in sheet from each training session, with all attending personnel, date, number of hours, and time of the training session.

G. Operating Instructions: Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.

3.14 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The Contractor shall provide a minimum of seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Covering exterior walls, interior partitions, and chases.
2. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will have the opportunity to review the installation and provide a written report noting deficiencies requiring correction. The Contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

C. Above-Ceiling Final Observation:

1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:
    a. Pipe insulation is installed and fully sealed.
    b. Pipe and duct wall penetrations are sealed.
    c. Pipe identification and valve tags are installed.
    d. Main, branch, and flexible ducts are installed.
    e. Diffusers, registers, and grilles are installed and connected to ductwork.
    f. Terminal air box reheat coil piping or wiring is complete.
    g. Terminal air box control wiring is complete and all control boxes are closed.
2. In order to prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.

3.15 RECORD DOCUMENTS

A. The following paragraphs supplement Division 01 requirements.

B. The Contractor shall record all changes from original design drawings made during installation. Changes shall be recorded on a dedicated copy of the final approved construction or coordination drawings using red ink on paper copies or red-line annotations on electronic copies, as directed by the Architect/Engineer.

C. This Contractor shall keep an updated set of prints, including changes, on the job site at all times.

D. Record documents shall include all deviations from the Contract Documents including any substitutions.

E. In addition to the requirements specified in Division 01, indicate the following installed conditions:

1. Ductwork mains and branches and locations of balancing dampers, motor-operated dampers, control devices, coils, etc.

2. Piping mains and branches and locations of isolation valves, balance valves, control valves, regulating valves, strainers, expansion devices or loops, air vents, etc.

3. Locations of all equipment controllers, control panels, sensors, control devices, etc.

4. Locations, inverts, and sizes of all underground piping and power.

F. If the project requires the preparation of coordination drawings, the coordination drawings shall be submitted as record documents.

G. Refer to Section 23 09 23 for additional requirements for Temperature Control documents.

H. Before completion of the project, electronic copies of the mechanical drawings will be provided to the Contractor for transfer of all as-built conditions. As-built markups shall be provided electronically in PDF format with redline annotations, or as directed by the Architect/Engineer.

3.16 PROJECT CLOSEOUT

A. Final Jobsite Observation:

1. In order to prevent the Final Jobsite Observation from occurring too early, the Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.

2. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

B. Before final payment is authorized, this Contractor must submit the following:

1. Operation and maintenance manuals with copies of approved shop drawings.

2. Record documents including marked-up drawings and specifications.

3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.

4. Start-up reports on all equipment requiring a factory installation inspection or start-up.

5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Architect/Engineer required prior to final payment approval.

END OF SECTION

SECTION 23 04 00

FIRESTOPPING

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

A. Only tested firestop systems shall be used in specific locations as follows:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

1.2 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.3 REFERENCES

A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Test Requirements: UL 1479, “Fire Tests of Through-Penetration Firestops”

C. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:

a. Firestop Devices (XHJI)

b. Fire Resistance Ratings (BXRH)

c. Through-Penetration Firestop Systems (XHEZ)

D. Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops”

E. ASTM E 84, “Standard Test Method for Surface Burning Characteristics of Building Materials”

F. ASTM C 679, “Standard Test Method for Tack-Free Time of Elastomeric Sealants”

G. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

H. Ohio Building Code

I. NFPA 101 - Life Safety Code

J. NFPA 70 - National Electric Code

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.

B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.5 SUBMITTALS

A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions.

B. engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor’s name who will install firestop system as described in document.

C. Submit safety data sheets provided with product delivered to job-site.

1.6 LABOR USE TO INSTALL FIRESTOP SYSTEMS

A. If firestopping is not assigned to a single-source firestop specialty contractor, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

1.7 INSTALLER QUALIFICATIONS

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

B. The installer must have no less than 3 years of experience with fire stop installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.9 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Provide a round fire-rated cable management device whenever cables penetrate fire rated walls, where frequent cable changes and additions may occur. The fire-rated cable management device shall consist of a corrugated steel tube with zinc coating, contain and inner plastic housing, intumescent material rings, and inner fabric smoke seal membrane. The length of the sleeve shall be 12.4 inches. The fire-rated cable management device shall contain integrated intumescent firestop wrap strip materials sufficient to maintain the hourly rating of the barrier being penetrated. The fire-rated cable management device shall contain a smoke seal fabric membrane or intumescent firestop plugs sufficient to achieve the L-Rating requirements of the barrier type. Install device per the manufacturer’s published installation instructions.

D. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

E. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

F. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

2.2 ACCEPTABLE MANUFACTURERS

A. 3M Fire Protection Products Division

B. Hilti, Inc.

C. Specified Technologies Inc.

2.3 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Basis of Spec: **Hilti, Inc**.

1. Equivalent products from approved manufacturers are acceptable subject to Engineer review and approval.

C. Pre-formed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors the following products are acceptable:

1. Hilti Cast-In Place Firestop Device (CP 680-P)

a. Add Aerator Adaptor when used in conjunction with aerator system.

2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.

3. Hilti Tub Box Kit (CP 681) for use with tub installations.

4. Hilti Firestop Speed Sleeve (CP 653) for use with cable penetrations.

5. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.

6. Hilti Firestop Block (CFS-BL)

7. Hilti Closet Stub (CFS-CID CS)

D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

2. Hilti Fire Foam (CP 620)

3. Hilti Flexible Firestop Sealant (CP 606)

4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)

5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti Silicone Sealant Gun Grade (CFS-S SIL GG)

2. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

3. Hilti Flexible Firestop Sealant (CP 606)

4. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

F. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)

G. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
2. Hilti Fire Foam (CP 620)
3. Hilti Flexible Firestop Sealant (CP 606)
4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)

H. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Firestop Putty Stick (CP 618)
2. Hilti Firestop Plug (CFS-PL)

I. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti Firestop Collar (CP 643N)
2. Hilti Firestop Collar (CP 644)
3. Hilti Wrap Strips (CP 648-E/648-S)

J. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Composite Sheet (CFS-COS)
3. Hilti Firestop Mortar (CP 637)
4. Hilti Fire Foam (CP 620)
5. Hilti Firestop Board (CP 675T)

K. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Firestop Board (CP 675T)

L. Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:

1. Hilti Firestop Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
2. Hilti Firestop Cable Collar (CFS-CC)
3. Hilti Firestop Sleeve (CFS-SL SK)
4. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
5. Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
6. Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.

M. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:

1. Hilti Firestop Block (CFS-BL)
2. Hilti Firestop Plug (CFS-PL)

N. For single or cable bundles up to one inch diameter penetrating gypsum, masonry, concrete walls or wood floor assemblies the following product is acceptable:

1. Hilti Firestop Cable Disc (CFS-D)

PART 3 - EXECUTION

3.1 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

3.3 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.4 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.5 WARRANTY

A. Provide manufacturer's standard warranty for all firestop materials and minimum 1-year warranty from installing contractor.

3.6 ADJUSTING AND CLEANING

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.7 SCHEDULE OF COMMON FIRESTOP SYSTEMS

CONCRETE (FLOOR TO FLOOR)	**1**	**FF-D-1012, FF-D-1013[1]**	**FF-D-1012, FF-D-1013**
	2	**FF-D-1012, FF-D-1013[1]**	**FF-D-1012, FF-D-1013**
	3	**FF-D-1011, FF-D-1026[1]**	**FF-D-1011, FF-D-1026**
	4	**FF-D-1047**	**FF-D-1125**
CONCRETE (EDGE OF FLOOR SLAB TO WALL)	**1**	**FW-D-1011, FW-D-1012, FW-D-1013**	**FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021**
	2	**FW-D-1011, FW-D-1012, FW-D-1013**	**FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021**
	3	**FW-D-1011**	**FW-D-1011, FW-D-1021**
	4	**FW-D-1047**	**FW-D-1092**
CONCRETE OR BLOCK WALL TO FLAT CONCRETE FLOOR (TOP-OF-WALL)	**1**	**N/A****	**N/A****
	2	**HW-D-0097[1]**	**HW-D-1009**
	3	**HW-D-1008[1], HW-D 0268**	**HW-D-1008**
	4	**HW-D-1042**	**HW-D-1103**
CONCRETE OR BLOCK WALL TO CONCRETE OVER FLUTED METAL DECK (TOP-OF-WALL)	**1**	**HW-D-0098**	**N/A****
	2	**HW-D-0080, HW-D-0081, HW-D-0098**	**HW-D-1037**
	3	**N/A****	**N/A****
	4	**HW-D-0294**	**N/A****
GYPSUM WALL TO FLAT CONCRETE FLOOR (TOP-OF-WALL)	**1**	**HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119**	**HW-D-1011, HW-D-1012, HW-1020**

	2	HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
	3	HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
GYPSUM SHAFT WALL TO (TOP-OF-WALL)	2	HW-D-0342 (FLAT CONCRETE) HW-D-0541, HW-D-0542 (CONCRETE OVER METAL DECK)	N/A**
GYPSUM SHAFT WALL TO CONCRETE FLOOR (BOTTOM-OF-WALL)	1	BW-S-0023	N/A**
	2	BW-S-0023	N/A**
GYPSUM WALL TO CONCRETE FLOOR (BOTTOM-OF-WALL)	1	BW-S-0001, BW-S-0002, BW-S-0039	N/A**
	2	BW-S-0001, BW-S-0002, BW-S-0039	N/A**
GYPSUM WALL TO CONCRETE OVER FLUTED METAL DECK (TOP-OF-WALL)	1	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-0292, HW-D-0295, HW-D-538*	HWD-1011, HWD-1012, HW-1020
	2	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-292, HW-D-0295, HW-D0538*	HW-D-1011, HW-D-1012, HW-D-1020
	3	HW-D-0292, HW-D-0295	HWD-1011, HWD-1012, HW-1020
	4	HW-D-0292, HW-D-0295	N/A**
CONCRETE (WALL TO WALL)	2	WW-D-0017, WW-D-0082	WW-D-1080, WW-D-1084
	3	WW-D-1011[1], WW-D-0032	WW-D-1011
	4	WW-D-1047	WW-D-1128
GYPSUM TO CONCRETE (WALL TO WALL)	1	WW-D-0040	N/A**
	2	WW-D-0040	N/A**

3.8 Schedule of through penetration firestop systems. Basis of design: Hilti, Inc.

TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM	TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM
METAL PIPES OR CONDUIT	1	F-C-1009, F-C-1059, F-C-1168	METAL PIPES OR CONDUIT	1	W-L-1054, W-L-1058, W-L-1164, W-L-1506
	2	F-C-1009, F-C-1059, F-C-1168		2	W-L-1054, W-L-1058, W-L-1164, W-L-1506
				4	W-L-1110, W-L-1111, W-L-1165
NON-METALLIC PIPE OR CONDUIT	1	F-C-2232, F-C-2030, F-C-2160, F-C-2389	NON-METALLIC PIPE OR CONDUIT	1	W-L-2078, W-L-2075, W-L-2128
	2	F-C-2029, F-C-2030, F-C-2128, F-C-2160		2	W-L-2078, W-L-2075, W-L-2128
				4	W-L-2184, W-L-2245

SINGLE OR BUNDLED CABLES	**1**	**F-C-3012, F-C-3110, F-C-3044**	**SINGLE OR BUNDLED CABLES**	**1**	**W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396**
	2	**F-C-3012, F-C-3110**		**2**	**W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396**
				3	**W-L-3385, W-L-3277**
				4	**W-L-3139, W-L-3334**
INSULATED PIPES	**1**	**F-C-5004, F-C-5037, F-C-5036**	**CABLE TRAY**	**1**	**W-L-4011, W-L-4019, W-L-4081**
				2	**W-L-4011, W-L-4019, W-L-4081**
				4	**W-L 8014**
	2	**F-C-5004, F-C-5037**	**INSULATED PIPES**	**1**	**W-L-5028, W-L-5029, W-L-5047**
				2	**W-L-5028, W-L-5029, W-L-5047**
				4	**W-L-5073**
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	**1**	**F-C-7013**	**NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS**	**1**	**W-L 7017, W-L-7040, W-L-7042, W-L-7155**
				2	**W-L-7040, W-L-7042, W-L-7155**
INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	**1**	**N/A****	**INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS**	**1**	**W-L-7059, W-L-7153, W-L-7156, W-L-7151**
	2	**N/A****		**2**	**W-L-7059, W-L-7153, W-L-7156, W-L-7151**
MIXED PENETRANTS	**1**	**F-C-8009, F-C-8014, F-C-826**	**MIXED PENETRANTS**	**1**	**W-L-1095, W-L-8013**
				2	**W-L-1095, W-L-8013**
				4	**W-L-8014**

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric motors for HVAC equipment, fractional through integral horsepower.

B. Electronically commutated motors (ECM) for applicable HVAC equipment.

C. Motors driven by variable frequency drives (VFDs).

1.2 RELATED REQUIREMENTS

A. Section 23 05 00 – Common Work Results for HVAC.

B. Division 26 – Electrical: Variable frequency drive specifications.

1.3 REFERENCE STANDARDS

A. NEMA MG 1 – Motors and Generators; current edition.

B. NFPA 70 – National Electrical Code; 2023 Edition.

C. DOE 10 CFR Part 431 – Energy Efficiency Standards for Electric Motors.

1.4 SUBMITTALS

A. Product Data: Motor nameplate data, efficiency ratings, power factor, enclosure type, insulation class, and service factor for each motor type provided.

B. Certification Data: NEMA Premium efficiency certification and DOE compliance documentation for motors 1 HP and larger.

1.5 WARRANTY

A. Refer to Closeout Submittals. Provide manufacturer’s standard warranty for motors: minimum 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. ABB / Baldor-Reliance

B. Regal Rexnord

C. Marathon Blue Chip

D. Siemens PE21 Premium Efficiency

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Construction:

1. Open drip-proof type except where specifically noted otherwise.

2. Provide totally enclosed fan-cooled (TEFC) motors for: outdoor locations; damp or wet locations; equipment rooms subject to wash-down; and where indicated on drawings or equipment schedules.

3. Design for continuous operation in 104 degrees F environment.

4. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

5. Motor Efficiency: Minimum NEMA Premium efficiency as listed in NEMA MG 1 Table 12-12 for motors 1 HP and larger. Comply with DOE minimum efficiency requirements per 10 CFR Part 431.

6. Service Factor: Minimum 1.15 for 60 Hz motors operating at nameplate voltage and frequency, except inverter duty motors (1.0 SF minimum).

7. Power Factor: Minimum 0.85 at full load for motors 1 HP and larger.

B. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

C. Wiring Terminations:

1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.

2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

D. Motors fed from variable frequency drives (VFDs)

1. All motors fed from VFD’s shall have shaft grounding rings factory installed: Electro Static Technology AEGIS SGR, Inpro/Seal AEGIS, or approved equal.

2. All motors fed from VFD’s shall be inverter duty, rated for VFDs with minimum Class F insulation and shall be constructed in conformance with NEMA MG1, current edition, Part 31 (Definite-Purpose Inverter-Fed Polyphase Motors) requirements for inverter duty motors.

2.3 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. General:

1. Provide ECM (brushless DC permanent magnet) motors with integrated variable-speed drives for the equipment types listed below. Motors shall be capable of 0–100% speed range with 0–10 VDC, PWM, or BACnet control signal as scheduled.

2. Minimum motor efficiency: 70% at full load for motors up to 1 HP; comply with DOE 10 CFR Part 431 for motors 1 HP and larger.

3. Insulation Class: Class F minimum. Maximum temperature rise: Class B (80° C).

B. Applications:

1. Roof Top Unit (RTU) supply and return/exhaust fan motors: Provide ECM motors where unit capacity is 5 tons and under. Motors shall be sized per equipment schedule.

2. DX Fan Coil Unit: Provide ECM blower motors. Control signal: 0–10 VDC from unit controller. Motors sized per equipment schedule.

3. Hydronic Fan Coil Unit: Provide ECM blower motors. Control signal: 0–10 VDC or BACnet as scheduled. Motors sized per equipment schedule.

4. Power Roof Ventilator (PRV): Provide ECM motors where unit capacity is 1,500 CFM and under. Control signal: 0–10 VDC. Motors sized per equipment schedule.
5. Fan Filter Unit (FFU): Provide ECM motors. Control signal: 0–10 VDC or discrete speed inputs as scheduled. Motors sized per equipment schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 05 16

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

C. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.

D. ASTM A536 - Standard Specification for Ductile Iron Castings 2019.

E. EJMA – Standards of the Expansion Joint Manufacturers Association, 11th Edition.

1.2 SUBMITTALS

A. See Division 23 01 00 General HVAC Requirements and Division 1 Administrative Requirements for additional submittal procedure information.

B. Product Data:

1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.

2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

C. Design Data: Indicate selection calculations.

D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.

E. Maintenance Data: Include adjustment instructions.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Packing for Packed Expansion Joints: One set for each joint.

1.3 WARRANTY

A. Refer to Section 23 01 00 - General HVAC Requirements. Provide manufacturer's standard warranty for all expansion joints and flexible connectors: minimum 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Manufacturers:

1. Mercer Rubber Company

2. The Metraflex Company

3. Twin City Hose

B. Inner Hose: Stainless Steel.

C. Exterior Sleeve: Single braided, stainless steel.

D. Pressure Rating: 125 psi and 450 degrees F.

E. Joint: Flanged.

F. Size: Use pipe sized units.

G. Maximum offset: 3/4 inch on each side of installed center line.

2.2 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

A. Manufacturer:

1. Mercer Rubber Company
2. The Metraflex Company
3. Twin City Hose

B. Inner Hose: Bronze.

C. Exterior Sleeve: Braided bronze.

D. Pressure Rating: 125 psi and 450 degrees F.

E. Joint: Flanged.

F. Size: Use pipe sized units.

G. Maximum offset: 3/4 inch on each side of installed center line.

H. Application: Copper piping.

2.3 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

A. Manufacturers:

1. Mercer Rubber Company
2. The Metraflex Company
3. Twin City Hose

B. Pressure Rating: 125 psi and 400 degrees F.

C. Maximum Compression: 1-3/4 inches.

D. Maximum Extension: 1/4 inch.

E. Joint: Flanged.

F. Size: Use pipe sized units.

G. Application: Steel piping 3 inches and under.

2.4 EXPANSION JOINTS - SINGLE SPHERE, FLEXIBLE COMPENSATOR

A. Manufacturers:

1. Mercer Rubber Company
2. The Metraflex Company; Cablesphere
3. Twin City Hose

B. Body: PTFE (polytetrafluoroethylene or aka: Teflon).

C. Pressure Rating, Sizes 3/4 Inch to 2 Inch: 150 psi and 210 degrees F.

D. Pressure Rating, Sizes 1-1/2 Inch to 12 Inch: 150 psi and 250 degrees F.

E. Pressure Rating, Sizes 14 Inch to 24 Inch: 105 psi and 250 degrees F.

F. Maximum Compression: 1/2 inch.

G. Maximum Elongation: 3/8 inch.

H. Maximum Offset: 3/8 inch.

I. Maximum Angular Movement: 15 degrees.

J. Joint: Tapped steel flanges.

K. Size: Use pipe sized units.

L. Accessories: Control cables.

M. Application: Steel piping 2 inches and over.

2.5 EXPANSION JOINTS - HOSE AND BRAID

A. Manufacturers:

1. The Metraflex Company; Metraloop
2. Twin City Hose

B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.

C. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.

1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
2. Accommodate the Following:
    a. Axial Deflection in Compression and Expansion: Per EJMA Standards for design temperature and pipe size.
    b. Lateral Movement: Per EJMA Standards for design temperature and pipe size."
    c. Angular Rotation: 15 degrees.
    d. Force developed by 1.5 times specified maximum allowable operating pressure.
3. End Connections: Same as specified for pipe jointing.
4. Provide necessary accessories including, but not limited to, swivel joints.

2.6 ACCESSORIES

A. Pipe Alignment Guides:

1. Manufacturers:
    a. The Metraflex Company; PGQ Glide Riser Guide
    b. Twin City Hose
    c. Anvil International
2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

B. Engineered Riser Anchor Clamps:

1. Applications:

a. Provide one clamp to serve as a riser clip.

1). Verify the total load of filled pipe to be supported will be a safety factor of one less (safety factor of 2) than the maximum loading of the clamp per the manufacturer's instructions.

b. Provide one clamp above and one clamp below the slab to anchor pipe.

1). Coordinate with the structural engineer to determine the maximum thrust loading calculated for the slab or floor structure. Use the maximum thrust loading calculations to verify the clamps will be a safety factor of one less (safety factor of 2) than the maximum loading of clamp per the manufacturer's instructions.

2. Provide two piece, ductile iron conforming to ASTM A536 . Use with metal pipes with an outer diameter of 2.5 inches to 8 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.

C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.

D. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

E. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION

SECTION 23 05 17

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013 (Reapproved 2017).

C. ASTM A47 - Standard Specification for Malleable Iron Castings.

D. ASTM A126 - Standard Specification for Gray Iron Castings.

E. ASTM B749 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Service.

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 PIPE SLEEVES

A. Manufacturers:

1. Flexicraft Industries
2. Metraflex
3. Advance Products & Systems (APS)

B. Vertical Piping:

1. Sleeve Length: 1 inch above finished floor.
2. Provide silicone sealant, rated for continuous immersion and thermal cycling, compatible with both pipe and sleeve materials
3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicone adhesive around opening.
4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors. Steel and brass sleeves shall be used for below-grade exterior applications and other applications where specified in Section 23 21 13 (Hydronic Piping) or on project drawings.

D. Pipe Passing Through Below Grade Exterior Walls:

1. Zinc coated or cast iron pipe.

2. Install manufactured sleeve-seal system in the penetration sleeve.

E. Clearances:

1. Provide allowance for insulated piping.

2. Wall, Floor, Partitions, and Beam Flanges: Provide clearance of 1 inch greater than the external pipe diameter to allow installation and future removal.

3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814 to prevent the spread of fire, smoke, and gases.

2.2 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:

1. Flexicraft Industries

2. Metraflex

3. Advance Products & Systems (APS)

B. Modular/Mechanical Seal:

1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.

2. Provide watertight seal between pipe and wall/casing opening.

3. Elastomer elements shall be EPDM or neoprene, compatible with chilled water, hot water, and refrigerants per ASHRAE 15, rated for continuous service from -40°F to +200°F, and sized per manufacturer's load and dimension tables.

4. Glass reinforced plastic pressure end plates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Inserts:

1. Provide inserts for placement in concrete formwork.

E. Structural Considerations:

1. Do not penetrate building structural members unless indicated.

F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

1. Aboveground Piping:

a. Pack solid using mineral fiber conforming to ASTM C592.

b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

c. For annular spaces exceeding 1 inch, first install backer rod, then apply caulk. Cure fully per manufacturer instructions before backfilling or insulating.

2. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Section 23 04 00 to prevent the spread of fire, smoke, and gases.

3. Caulk exterior wall sleeves watertight with mechanically expandable chloroprene inserts with mastic-sealed components, or equivalent manufactured sleeve-seal system, to maintain structural and water integrity.

G. Manufactured Sleeve-Seal Systems:

1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.

2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.

3. Locate piping in center of sleeve or penetration.

4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.

5. Tighten bolting for a water-tight seal.

6. Install in accordance with manufacturer's recommendations.

H. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

I. Verification and Testing:

1. Contractor shall verify that all installed sleeve seals conform to specification requirements and that fire-rated seals meet ASTM E814 performance. Provide written certification of seal integrity, including photographs and any hydrostatic testing results, for submittal to the engineer before final acceptance

END OF SECTION

SECTION 23 05 19

METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2019.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014 (Reapproved 2020).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014 (Reapproved 2021).

D. AWWA C700 - Cold-Water Meters -- Displacement Type, Metal Alloy Main Case 2020.

E. AWWA C701 - Cold-Water Meters -- Turbine Type, for Customer Service 2019.

F. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance 2012, with Addendum (2018).

G. UL 393 - Indicating Pressure Gauges for Fire-Protection Service Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Section 23 01 00 - General HVAC Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range, and location for manufactured components.

C. Provide calibration certificates for all gauges and thermometers, installation drawings with tap locations, and accuracy documentation per referenced standards

D. Project Record Documents: Record actual locations of components and instrumentation.

E. Operation and Maintenance Data

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Product Requirements, for additional provisions.

PART 2 - PRODUCTS

2.1 PRESSURE AND TEMPERATURE RANGES

A. Provide thermometers and pressure gauges with the following operating ranges per system type, as indicated in the chart below.

Service	Temperature (°F)		Pressure (psig)	
	Min	Max	Min	Max
Heating Hot Water (140°F – 160°F)	0	300	0	160

B. PRESSURE GAUGES

1. Manufacturers:
   a. Dwyer Instruments, Inc
   b. Moeller Instrument Company, Inc
   c. Omega Engineering, Inc
   d. Trerice
   e. Weiss Instruments
2. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background. Provide snubbers for pressure gauges installed near pumps.
   a. Case: Steel with brass bourdon tube.
   b. Size: 4-1/2 inch diameter.
   c. Mid-Scale Accuracy: One percent.
   d. Scale: Psi.

C. PRESSURE GAUGE TAPPINGS

1. Gauge Cock: ball valve rated for 300 psi.
2. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

D. STEM TYPE THERMOMETERS

1. Manufacturers:
   a. Dwyer Instruments, Inc
   b. Omega Engineering, Inc
   c. Weksler Glass Thermometer Corp
   d. Trerice
   e. Weiss Instruments
2. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   a. Size: 9 inch scale.
   b. Window: Clear Lexan.
   c. Stem: 3/4 inch NPT brass.
   d. Accuracy: 2 percent, per ASTM E77.
   e. Calibration: Degrees F.

2.2 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

C. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Viton core for temperatures up to 400 degrees F.

D. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gauges, one gauge adapters with 1/8 inch probes, two 1 inch dial thermometers.

2.3 STATIC PRESSURE GAUGES

A. Manufacturers:

1. Dwyer Instruments, Inc
2. Omega Engineering, Inc
3. Veris Industries
4. Weksler Glass Thermometer Corp
5. Weiss

B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

C. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

D. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

2.4 FILTER GAUGES

A. Manufacturers

1. Dwyer Instruments, Inc
2. Omega Engineering, Inc
3. Veris Industries
4. Weksler Glass Thermometer Corp
5. Weiss

B. Accuracy: 2 percent, per ASTM E77.

C. Range: 0–2.5” water column range,

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.

C. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.

D. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Provide siphon on gauges in steam systems. Extend nipples and siphons to allow clearance from insulation.

E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

F. Coil and conceal excess capillary on remote element instruments.

G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. All steam pressure gauges shall have syphons.

I. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

J. Locate test plugs adjacent thermometers and thermometer sockets.

K. Where gauges are equipped with transmitters for remote display or BAS integration, ensure signal output and calibration is documented per Section 23 09 23.

3.2 Calibration

A. Perform zero-point calibration per ASTM E77 procedures. Accept zero offset within ±1 division of scale center. Document all calibration adjustments in Project Record Documents per Section 1.4

END OF SECTION

SECTION 23 05 23

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 ABBREVIATIONS AND ACRONYMS

A. CWP — Cold Working Pressure

B. NPS — Nominal Pipe Size

C. NRS — Non-Rising Stem

D. OSY — Outside Screw and Yoke

E. EPDM — Ethylene Propylene Diene Monomer

F. TFE — Tetrafluoroethylene

G. BI — Bi-directional

1.2 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding 2022.

B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).

C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.

F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.

H. ASME B31.1 - Power Piping 2022.

I. ASME B31.9 - Building Services Piping 2020.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2021.

K. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.

L. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).

M. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service 2021.

N. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).

O. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

P. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars 2021.

Q. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings 2015 (Reapproved 2021).

R. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.

S. AWWA C606 - Grooved and Shouldered Joints 2015.

T. MSS SP-67 - Butterfly Valves 2022.

U. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends 2018.

V. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends 2018.

W. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.

X. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2020.

Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

Z. MSS SP-125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided 2018.

1.3 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

E. Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1. See Product Requirements, for additional provisions.

1.4 QUALITY ASSURANCE

A. Manufacturer:

1. Obtain valves for each valve type from single manufacturer.

2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide valves furnished by one of the following:

1. Crane

2. Milwaukee

3. Apollo

4. Stockham

5. Hammond
6. Nibco
7. Watts
8. Tour & Andersson
9. Titan

2.2 APPLICATIONS

A. See drawings for specific valve locations.

B. Provide the following valves for the applications if not indicated on drawings:

1. Swing Check (Pump Outlet):

a. 2 NPS and Smaller: Bronze with bronze disc.

b. 2-1/2 NPS and Larger: Iron swing check with one of the following closure control options: lever and weight (for low-head pumps), lever and spring (for medium-head pumps), center-guided metal or center-guided with resilient seat (for high-head applications). Closure control option shall be selected based on pump discharge head

2. Dead-End Application Butterfly Valves: Single-flange (lug) type, ductile iron body, aluminum-bronze disc, EPDM seat.

C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

D. Required Valve End Connections for Non-Wafer Types:

1. Steel Pipe:

a. 2 NPS and Smaller: Threaded ends.

b. 2-1/2 NPS and Larger: Grooved ends or flanged ends.

2. Copper Tube:

a. 2 NPS and Smaller: Threaded ends (Exception: Solder-joint valve-ends).

b. 2-1/2 NPS and Larger: Grooved ends.

E. Heating Hot Water Valves:

1. 2 NPS and Smaller, Brass and Bronze Valves:

a. Threaded ends.

b. Ball: Full port, one piece, brass trim.

c. Swing Check: Bronze disc, Class 125.

2. 2-1/2 NPS and Larger, Iron Valves:

a. Single-Flange Butterfly: 2-1/2 NPS to 12 NPS, aluminum-bronze disc, EPDM seat, 200 CWP.

b. Single-Flange Butterfly: 14 NPS to 24 NPS, aluminum-bronze disc, EPDM seat, 150 CWP.

c. Grooved-End Butterfly: 2-1/2 NPS to 12 NPS, 175 CWP.

d. Swing Check: Metal seats, Class 125.

e. Grooved-End Swing Check: 3 NPS to 12 NPS, 300 CWP.

f. Center-Guided Check: 2-1/2 NPS to 24 inch, compact-wafer, metal seat, Class 125 (for systems ≤200 psi); or Class 250 (for systems >200 psi)

2.3 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

1. Quarter-turn valves: ball, butterfly, and plug types.

2. Full-opening valves: gate and globe types.

C. Valve Actuator Types:

1. Gear Actuator: Quarter-turn valves 8 NPS and larger.

2. Handwheel: Valves other than quarter-turn types.

3. Hand Lever: Quarter-turn valves 6 NPS and smaller

4. Wrench: Plug valves with square heads.

5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:

1. Gate Valves: Rising stem.

2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

3. Butterfly Valves: Extended neck.

4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:

1. Threaded End Valves: ASME B1.20.1.

2. Flanges: ASME B16.1 (gray cast iron, Classes 125 and 250), ASME B16.5 (ductile iron and steel, Classes 150 and 300).

3. Solder Joint Connections: ASME B16.18.

4. Grooved End Connections: AWWA C606.

F. General ASME Compliance:

1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.

2. Power Piping Valves: ASME B31.1.

3. Building Services Piping Valves: ASME B31.9.

G. Bronze Valves:

1. Fabricate from dezincification resistant material.

2. Copper alloys containing more than 15 percent zinc are not permitted.

H. Source Limitations: Obtain each valve type from a single manufacturer.

2.4 BRASS OR BRONZE BALL VALVES

A. Two Piece, Full Port with Stainless Steel Trim:

1. Comply with MSS SP-110.
2. SWP Rating: 150 psig.
3. CWP Rating: 600 psig.
4. Body: Forged brass.
5. Ends: Threaded.
6. Seats: TFE.
7. Stem: Stainless Steel.
8. Ball: Chrome-plated brass.

2.5 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead end service without downstream flange.
1. Comply with MSS SP-67, Type I.
2. CWP Rating: 200 psig.
3. Body Material: ASTM A126 cast iron or ASTM A536 ductile iron.
4. Stem: One or two-piece stainless steel.
5. Seat: EPDM.
6. Disc: Aluminum-bronze.

2.6 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psig, 300 psig: 8 NPS or smaller, and 200 psig: 10 NPS or larger.
1. Comply with MSS SP-67, Type I.
2. Body: Coated ductile iron.
3. Stem: Stainless steel.
4. Disc: Coated ductile iron.
5. Disc Seal: EPDM.

2.7 BRONZE SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig
1. Comply with MSS SP-80, Type 3.
2. Body Design: Horizontal flow.
3. Body Material: Bronze, ASTM B62.
4. Ends: Threaded.
5. Disc: Bronze.

2.8 IRON, FLANGED END SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig with Metal Seats.
1. Comply with MSS SP-71, Type I.
2. Design: Clear or full waterway with flanged ends.
3. Body: Gray iron with bolted bonnet in accordance with ASTM A126.
4. Trim: Bronze.

5. Disc Holder: Bronze.
6. Gasket: Asbestos free.

2.9 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125:
1. Comply with MSS SP-71, Type I.
2. Body Design: Clear or full waterway.
3. Body Material: ASTM A126, gray iron with bolted bonnet.
4. Ends: Flanged.
5. Trim: Bronze.
6. Gasket: Asbestos free.
7. Closer Control: Factory installed, exterior lever, and spring or weight.

2.10 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:
1. 2 NPS to 8 NPS.
2. 10 NPS to 12 NPS.
3. CWP Rating: 300 psig.
4. Body Material: ASTM A536, Grade 65-45-12 ductile iron.
5. Seal: EPDM.
6. Disc: Ductile iron.
7. Coating: Black, non-lead paint.

2.11 IRON, CENTER-GUIDED CHECK VALVES

A. Class 125, Compact-Wafer:
1. Comply with MSS SP-125.
2. Body Material: ASTM A126, gray iron.
3. Metal Seat: Bronze.

B. Class 125, Globe:
1. Comply with MSS SP-125.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
3. 14 NPS to 24 NPS, CWP Rating: 150 psig.
4. Body Material: ASTM A126, gray iron.
5. Style: Spring loaded.
6. Ends: Flanged.
7. Metal Seat: Bronze.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. If a valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Install check valves where necessary to maintain direction of flow as follows:

1. Swing Check: Install horizontal maintaining hinge pin level.

2. Orient center-guided into horizontal or vertical position, between flanges.

D. Provide chainwheels on operators for valves 4 NPS and larger where located 96 inches or more above finished floor, with the handwheel or operating device positioned at 60 inches above finished floor.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.

F. MFMA-4 - Metal Framing Standards Publication 2004.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials 2022

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured.

1.3 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.4 QUALITY ASSURANCE

A. Comply with applicable building code.

PART 2 - PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
2. Comply with MFMA-4.
3. Channel Material:
    a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: 1/2 inch diameter.
    b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
    c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
    d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Thermal Insulated Pipe Supports:

1. General Construction and Requirements:

a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.

c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.

d. Insulation inserts to consist of polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.

2. PVC Jacket:

a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.

b. Minimum Service Temperature: Minus 40 degrees F.

c. Maximum Service Temperature: 180 degrees F.

d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.

e. Thickness: 60 mil.

3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as detailed on drawings.

E. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.2 Hydronic Piping Supports and Hangers

A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.

C. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.

D. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.

F. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

G. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.

H. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

I. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.

J. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.

K. Vertical Support: Steel riser clamp.

L. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

M. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad.

5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

J. Hydronic Piping Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.

2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.

3. Place hangers within 12 inches of each horizontal elbow.

4. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
8. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.

3.3 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.

B. Hanger Spacing for Steel Non-Steam Piping.
   1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
   2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
   5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
   6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
   7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
   8. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.

3.4 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUBMITTALS

A. See Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

A. Air Terminal Units: Tags.

B. Automatic Controls: Tags. Key to control schematic.

C. Control Panels: Nameplates.

D. Major Control Components: Nameplates.

E. Piping: Tags.

F. Pumps: Nameplates.

G. Relays: Tags.

H. Small-sized Equipment: Tags.

I. Thermostats: Nameplates.

J. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.2 NAMEPLATES

A. Manufacturers:

1. Advanced Graphic Engraving, LLC
2. Brimar Industries, Inc
3. Kolbi Pipe Marker Co
4. Seton Identification Products, a Tricor Direct Company
5. Original Equipment Manufacturer

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

2.3 TAGS

A. Manufacturers:

1. Advanced Graphic Engraving
2. Brady Corporation
3. Brimar Industries, Inc
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 ADHESIVE-BACKED DUCT MARKERS

A. Manufacturers:

1. Brimar Industries, Inc

B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.

C. Style: Individual Label.

D. Color: Green - supply air, Yellow - exhaust air, blue - outside air, relief air, return air, and mixed air..

2.5 STENCILS

A. Manufacturers:

1. Brady Corporation
2. Kolbi Pipe Marker Co
3. Seton Identification Products, a Tricor Company

B. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Ductwork and Equipment: 2-1/2 inch high letters.

C. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.6 PIPE MARKERS

A. Manufacturers:

1. Brady Corporation
2. Brimar Industries, Inc
3. Kolbi Pipe Marker Co
4. MIFAB, Inc
5. Seton Identification Products, a Tricor Company

B. Color: Conform to ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. Color code as follows:

1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
2. Toxic and Corrosive Fluids: Orange with black letters.
3. Compressed Air: Blue with white letters.

2.7 CEILING TACKS

A. Manufacturers:

1. Craftmark

B. Description: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:

1. HVAC Equipment: Yellow.
2. Fire Dampers and Smoke Dampers: Red.
3. Heating/Cooling Valves: Blue.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Use tags on piping 3/4 inch diameter and smaller.

1. Identify service, flow direction, and pressure.

2. Install in clear view and align with axis of piping.

3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

H. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

I. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems 2015, with Errata (2017).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

C. Revise TAB plan to reflect actual procedures and submit as part of final report.

D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.

E. Include actual instrument list, with manufacturer name, serial number, and date of calibration.

F. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.

G. Units of Measure: Report data in I-P (inch-pound) units only.

H. Include the following on the title page of each report:

1. Name of Testing, Adjusting, and Balancing Agency.
2. Address of Testing, Adjusting, and Balancing Agency.
3. Telephone number of Testing, Adjusting, and Balancing Agency.
4. Project name.
5. Project location.
6. Project Engineer.
7. Project Contractor.
8. Report date.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:

1. AABC (NSTSB), AABC National Standards for Total System Balance.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:

1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.

2. Having minimum of three years documented experience.

3. Certified by one of the following:

a. AABC, Associated Air Balance Council: Upon completion submit AABC National Performance Guaranty.

b. NEBB, National Environmental Balancing Bureau

4. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

E. Refer to 23 31 00 HVAC Ducts and Casings specification for additional information on the duct construction, pressure class, and allowable leakage.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

B. Systems are started and operating in a safe and normal condition.

C. Temperature control systems are installed complete and operable.

D. Proper thermal overload protection is in place for electrical equipment.

E. Final filters are clean and in place. If required, install temporary media in addition to final filters.

F. Duct systems are clean of debris.

G. Fans are rotating correctly.

H. Fire and volume dampers are in place and open.

I. Air coil fins are cleaned and combed.

J. Access doors are closed and duct end caps are in place.

K. Air outlets are installed and connected.

L. Duct system leakage is minimized.

M. Hydronic systems are flushed, filled, and vented.

N. Pumps are rotating correctly.

O. Proper strainer baskets are clean and in place.

P. Service and balance valves are open.

Q. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.3 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, outside, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

I. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

J. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

K. For variable air volume systems, in order for the OA Damper to bring in the proper amount of Minimum OA, the balancing contractor shall work with the temp controls contractor to determine the Min Damper Position at 3 different fan speeds and generate a curve for it. For example, at Min Fan Speed the OA Damper may be 100% open, but at 100% Speed it may only need to be 40% open to get the same air. This must be calibrated by the Balancer and TCC and programed in the automation system.

L. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.6 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Effect system balance with automatic control valves fully open to heat transfer elements.

D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

E. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.

D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.

E. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).

F. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).

G. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation 2020.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.

J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

K. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Administrative Requirements Section for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 10 years of experience and approved by manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

A. Manufacturer:

1. Johns Manville
2. Knauf Insulation
3. Owens Corning Corporation
4. CertainTeed Corporation

B. Insulation: ASTM C553; flexible, noncombustible blanket.

1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 1200 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:

1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Outdoor Vapor Barrier Mastic:

1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

2.3 GLASS FIBER, RIGID

A. Manufacturer:

1. Johns Manville
2. Knauf Insulation
3. Owens Corning Corporation; 700 Series FIBERGLAS Insulation
4. CertainTeed Corporation

B. Insulation: ASTM C612; rigid, noncombustible blanket.

1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent.
4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:

1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Indoor Vapor Barrier Finish:

1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.4 JACKETS

A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

B. Mineral Fiber (Outdoor) Jacket: Asphalt impregnated and coated sheet, 50 lb/square.

C. Aluminum Jacket: ASTM B209 (ASTM B209M).

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.5 DUCT LINER

A. Manufacturers:

1. Armacell LLC
2. Johns Manville
3. Knauf Insulation
4. Owens Corning Corporation
5. CertainTeed Corporation

B. Note: Choose the liner type - Elastomeric Foam or Glass Fiber.

C. Elastomeric Foam Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.

1. Minimum Service Temperature: Minus 40 degrees F.

2. Maximum Service Temperature: 180 degrees F.
3. Fungal Resistance: No growth when tested according to ASTM G21.
4. Apparent Thermal Conductivity: Maximum of 0.28 at 75 degrees F.
5. Minimum Noise Reduction Coefficients:
   a. 1 inch Thickness: 0.40.
6. Connection: Waterproof vapor barrier adhesive.

D. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation. Comply with ASTM C916.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with calked aluminum jacket with seams located on bottom side of horizontal duct section. Jackets shall be slopped to prevent "pooling" of water on the top of ductwork.

F. External Duct Insulation Application:
1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Duct and Plenum Liner Application:

1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES (where two options are listed: bidders choice)

A. Supply, Mixed and Relief Air Ducts, concealed in air-conditioned space:

1. Flexible Glass Fiber Duct Insulation: 2 inch thick with vapor barrier jacket.

B. Supply, Mixed and Relief Air Ducts, exposed in air-conditioned space:

1. Rigid Glass Fiber Duct Insulation: 2 inches thick with vapor barrier jacket.

C. Supply, Mixed and Relief Air Ducts, in unconditioned space:

1. Rigid Glass Fiber Duct Insulation: 2 inches thick with vapor barrier jacket.

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.

E. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).

F. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement 2007 (Reapproved 2019).

G. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.

H. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.

I. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.

J. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).

K. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).

L. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service 2022.

M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

N. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.

O. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).

P. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).

Q. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials 2013 (Reapproved 2021).

R. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 10 years of experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.5 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER

A. Manufacturers:

1. CertainTeed Corporation
2. Johns Manville Corporation
3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation
4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.

1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive: Compatible with insulation.

F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric:

1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 lb/cu ft density.
3. Weave: 5 by 5.

H. Indoor Vapor Barrier Finish:

1. Cloth: Untreated; 9 oz/sq yd weight.

I. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

J. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

K. Insulating Cement: ASTM C449.

2.3 JACKETS

A. PVC Plastic.

1. Manufacturers:
   a. Johns Manville Corporation
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
   a. Maximum Service Temperature: 150 degrees F.
   b. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
   c. Thickness: 10 mil.
   d. Connections: Brush on welding adhesive.
3. Covering Adhesive Mastic: Compatible with insulation.

B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

1. Lagging Adhesive: Compatible with insulation.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

D. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.

1. Thickness: 0.010 inch.
2. Finish: Smooth.
3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

E. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

F. Glass fiber insulated pipes conveying fluids above ambient temperature.

1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

G. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.

2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

3. Insert location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

3.3 SCHEDULE

A. Heating Systems Interior Pipe Insulation:

1. Heating Water Supply and Return (100 - 200 deg F):

a. Glass fiber with all service jacket; 1-1/2 inch thick, sizes 1-1/4 inches and under; 2 inches thick, sizes 2 inches and above.

1). with PVC, aluminum or stainless steel jacket (where indicated on drawings only).

END OF SECTION

SECTION 23 09 13

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 - GENERAL

1.1 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

E. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

1. Revise shop drawings to reflect actual installation and operating sequences.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum 10 years experienceapproved by manufacturer.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.2 CONTROL PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

B. Provide common keying for all panels.

2.3 CONTROL VALVES

A. Globe Pattern:

1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
3. Hydronic Systems:
    a. Rate for service pressure of 125 psig at 250 degrees F.
    b. Replaceable plugs and seats of stainless steel.
    c. Size for 3 psig maximum pressure drop at design flow rate.
    d. two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.
4. Low Pressure Steam Systems:
    a. Replaceable plugs and seats of stainless steel. Pressure drop across any steam valve at maximum flow; as indicated on drawings.
    b. Size for 10 psig inlet pressure and 5 psig pressure drop.
    c. Valves shall have modified linear characteristics.

B. Butterfly Pattern:
1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F wafer or lug ends, extended neck.
2. Hydronic Systems:
    a. Rate for service pressure of 125 psig at 250 degrees F.

C. Pressure independent automatic balance and control valves
1. Manufacturers:
    a. Danfoss
    b. Siemens
    c. Tour & Andersson
    d. Flow Design
2. Control Valves: Factory-fabricated pressure independent with internal differential pressure regulator (DPRV) which automatically adjusts to normal changes in system pressure and provides 100 percent control valve authority at all positions of the valve.
    a. Maintain proportional and linear flow coil characteristics.
    b. PICV to accurately control the flow from 0 to 100 percent full rated flow with an operating pressure differential range of 3 to 60 psig.
    c. Provide ANSI/FCI 70-2 Class 4 shut-off on all sizes and field serviceable.
    d. Provide control valve to incorporate control, balancing and flow limiting. Hydronic system pressure independent control valve bodies to comply with ASME B16.34 or ASME B16.15 pressure and temperature class ratings based on the design operating temperature and 150 percent of the system design operating pressure and have the following characteristics:
        1). 2 NPS and Smaller: Class 150 bronze or brass body with union connections, stainless steel trim trim, stainless steel rising stem,

stainless steel disc or ball, and screwed ends with backseating capacity repackable under pressure.

2). 2-1/2 NPS and Larger: Class 125 iron or ductile iron body, stainless steel trim, stainless steel rising stem, stainless steel disc or ball, flanged ends with backseating capacity repackable under pressure.

3). Pressure Control Seat: Brass construction with vulcanized EPDM.

4). Sizing: Line-size.

5). Fittings and Components: All fittings and components to meet ANSI standards and be compatible with readily available components. 8 inch valves and above to be provided with proper companion flanges.

6). Close-Off (Differential) Pressure Rating: Combination of actuator, DPRV action, and trim to provide a minimum close-off pressure rating of 150 percent of total system (pump) head. Provide actuator from the same manufacturer as the pressure independent control valve.

3. Electronic Actuators: Direct-mounted, self-calibrating type designed for minimum 60,000 full-stroke cycles at rated force.

4. Provide actuator with visible position indication. Fail positions on power failure to include in-place, open or closed as indicated in the controls specifications.

a. Valves: Sized for maximum circuit flow rate and nominally, line-sized.

D. Electronic Operators:

1. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.

2. Select operator for full shut off at maximum pump differential pressure.

2.4 DAMPERS

A. Manufacturers:

B. Performance: Test in accordance with AMCA 500-D.

C. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch.

D. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gage, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.

E. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.

F. Jamb Seals: Spring stainless steel.

G. Shaft Bearings: Oil impregnated sintered bronze.

H. Linkage Bearings: Oil impregnated sintered bronze.

I. Leakage: Less than one percent based on approach velocity of 2000 ft per min and 4 inches wg.

J. Temperature Limits: Minus 40 to 200 degrees F.

2.5 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
2. Provide one operator for maximum 36 sq ft damper section.

B. Electric Operators:

1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

2.6 INPUT/OUTPUT SENSORS

A. Temperature Sensors:

1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
4. Temperature Sensing Device: Compatible with project DDC controllers.
5. Performance Characteristics:
   a. RTD:
      1). Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
      2). Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
      3). Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
      4). All Other Accuracy: Plus/minus 0.75 degrees F minimum.
      5). Range: Minus 40 degrees F through 220 degrees F minimum.
   b. Thermistor:
      1). Accuracy (All): Plus/minus 0.36 degrees F minimum.
      2). Range: Minus 25 degrees F through 122 degrees F minimum.
      3). Heat Dissipation Constant: 2.7 mW per degree C.
   c. Temperature Transmitter:
      1). Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
   d. Sensing Range:
      1). Provide limited range sensors if required to sense the range expected for a respective point.
      2). Use RTD type sensors for extended ranges beyond minus 30 degrees F to 230 degrees F.
      3). Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
   e. Wire Resistance:
      1). Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.

2). Compensate for wire resistance in software input definition when feature is available in the DDC controller.

f. Room Sensors: Locking cover as indicated on drawings.

g. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.

h. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.

i. Ceiling and Recessed Mount Temperature Sensors: Ceiling-mounted sensor in a low-profile housing.

j. Room Temperature Sensors:

1). Construct for surface or wall box mounting.

2). Provide the following:

a). Setpoint reset slide switch with an adjustable temperature range.

k. Room Temperature Sensors with Integral Digital Display:

1). Construct for surface or wall box.

2). Provide a four button keypad with the following capabilities:

a). Indication of space and outdoor temperatures.

b). Setpoint adjustment to accommodate Sequence of Operation.

l. Temperature Averaging Elements:

1). Use on duct sensors for ductwork 10 sq ft or larger.

2). Use averaging elements where prone to stratification with sensor length designed such that there is 1 linear foot of sensor for every square foot of duct / AHU cross section. ft.

3). Provide for all mixed air and heating coil discharge sensors regardless of duct size.

m. Insertion Elements:

1). Use in ducts not affected by temperature stratification or smaller than 144 sq inches.

2). Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches.

B. Humidity Sensors:

1. Wall Mounted Sensor: Voltage type encased in a plastic housing.

C. Static Pressure (Air Pressure) Sensors:

1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.

2. Stainless steel static pressure tips with mounting flange with integral rubber gasket and two screws for simplifying mounting on a duct.

3. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.

4. Accuracy: One percent of full scale with repeatability 0.3 percent.

5. Output: 0 to 5 vdc with power at 12 to 28 vdc.

D. Equipment Operation (Current) Sensors:

1. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

2.7 THERMOSTATS

A. Electric Room Thermostats:

1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
2. Service: Cooling and heating.
3. Covers: Locking with set point adjustment, and thermometer as indicated on drawings..

B. Room Thermostat Accessories:

1. Insulating Bases: For thermostats located on exterior walls.

2.8 TRANSMITTERS

A. Pressure Transmitters:

1. One pipe direct acting indicating type for gas, liquid, or steam service, range suitable for system, proportional electronic output.

B. Water Pressure Transmitters (Liquid Differential Pressure Transmitters):

1. General: Provide wet media differential pressure transducers with 6 ft (1.83 m) armored cable, to allow remote pressure sensing capability using existing plumbing runs.
   a. Input Power: Class 2; 15 to 30 VDC, 24VAC nominal, 50/60 Hz.
   b. Maximum Current Draw:
   c. Output: 3-wire transmitter; user-selectable, 4 to 20 mA (0 to 5V/0 to 10V).
   d. Sensor:
      1). Media Compatibility: 17 to 4 PH stainless steel.
      2). Status Indication: Dual color LED.
      3). Accuracy at 77 degrees F for less than or equal 20 ft:
         a). Ranges A and B: Plus/minus 1 percent F.S. typical.
      4). Long Term Stability: Plus/minus 0.25 percent.
   e. Pressure Ranges:
      1). As required by application.
   f. Operating Conditions:
      1). Sensor Operating Range: Minus 4 degrees F to 200 degrees F.
      2). Operating Environment: 14 degrees F to 122 degrees F; 10 to 90 percent RH noncondensing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that systems are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

F. Ensure installation of components is complementary to installation of similar components.

G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats.

C. Mount freeze protection thermostats using flanges and element holders.

D. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

E. Provide valves with position indicators and with pilot positioners where sequenced with other controls.

F. Provide separate steam valves for each bank of coils. Provide two valves in parallel where steam load exceeds 1500 lb per hr with 1/3 to 2/3 load capacities sequenced with smaller valve opening first.

G. Provide mixing dampers of parallel blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors.

H. Provide isolation (two position) dampers of parallel blade construction.

I. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.

J. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

K. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

L. Provide conduit and electrical wiring. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.3 MAINTENANCE

A. Provide service and maintenance of control system for one year from Date of Substantial Completion.

B. Provide complete service of controls systems, including call backs, and submit written report of each service call.

C. In addition to normal service calls, make minimum of 3 complete normal inspections of approximately 10 hours duration to inspect, calibrate, and adjust controls.

END OF SECTION

SECTION 23 09 14

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification is to cover a complete Variable Frequency Drive consisting of a pulse width modulated (PWM) inverter designed for use with a standard NEMA Design B induction motor.

B. The drive manufacturer shall supply the drive and all necessary options as herein specified. VFDs that are manufactured by a third party and "brand labeled" shall not be acceptable. All VFDs installed on this project shall be from the same manufacturer.

1.2 QUALITY ASSURANCE

A. Referenced Standards and Guidelines:

1. IEEE 519-1992, Guide for Harmonic Content and Control.
2. UL508(A)(C)
3. ICS 7.0, AC Adjustable Speed Drives
4. EN/IEC 61800-3
5. NEC 430.120, Adjustable-Speed Drive Systems
6. IBC 2012 Seismic - referencing ASC 7-05 and ICC AC-156

B. Qualifications:

1. VFDs and options shall be UL508 listed as a complete assembly. The base VFD shall be UL labeled 100 kA RMS Symmetrical, 600V max.
2. CE Mark - The base VFD shall meet product standard EN 61800-3 for the First Environment restricted level (Category C2). (RFI / EMI Filter spec).
3. The entire VFD assembly, including the bypass (if specified), shall be seismically certified and labeled as such in accordance with the 2012 International Building Code (IBC):
    a. VFD manufacturer shall provide Seismic Certification and Installation requirements at time of submittal.
    b. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake test data as defined by ICC AC-156.
    c. Seismic ratings based upon calculations alone are not acceptable. Certification of Seismic rating must be based on testing done in all three axis of motion by a certified lab.
    d. Special seismic certification of equipment and components shall be provided by OSHPD preapproval.

1.3 SUBMITTALS

A. Submittals shall include the following information:

1. Outline dimensions, conduit entry locations and weight.

2. Customer connection and power wiring diagrams.
3. Complete technical product description include a complete list of options provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with these specifications, furnish VFD's by one of the following manufacturers:

1. ABB
2. Danfoss Graham
3. Allen Bradley
4. Cutler Hammer

2.2 VARIABLE FREQUENCY DRIVES

A. The VFD package as specified herein and defined on the VFD schedule shall be enclosed in a UL Type enclosure (enclosures with only NEMA ratings are not acceptable).

1. Environmental operating conditions: -15 to 40° C (5 to 104° F) continuous. Altitude 0 to 3300 feet above sea level, less than 95%, non-condensing All circuit boards shall be coated to protect against corrosion.

B. All VFDs shall have the following standard features.

1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
2. The keypad shall include Hand-Off-Auto selections and manual speed control. There shall be fault reset and “Help” buttons on the keypad. The Help button shall include “on-line” assistance for programming and troubleshooting.
3. VFDs through 200 HP shall have internal chokes (reactors) providing 5% impedance to reduce the harmonics to the power line and to add protection from AC line transients.
4. The input current rating of the VFD shall not be greater than the output current rating. VFD’s with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.122
5. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus.

C. All VFDs to have the following adjustments:

1. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close.
2. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates
3. The VFD shall include a fireman's override input. The mode shall override all other inputs (analog/digital, serial communication, and all keypad commands), except customer defined safety run interlocks, and force the motor to run at a preset speed or in a separate PID mode.

D. Serial Communications

1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, and BACnet. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority (i.e. BTL Listing for BACnet).

E. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level (Category C2).

F. DRIVE OPTIONS - Options shall be furnished and mounted by the drive manufacturer as defined on the VFD schedule. All optional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.

G. BYPASS - Bypasses shall be furnished and mounted by the drive manufacturer as defined on the VFD schedule. All VFD with bypass configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.

1. A complete factory wired and tested bypass system consisting of a door interlocked, padlockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses. UL Listed motor overload protection shall be provided in both drive and bypass modes.
2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the "Off" position before either enclosure may be accessed.
3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 Amps and this rating shall be indicated on the UL data label.
4. The bypass shall maintain positive contactor control through the voltage tolerance window of nominal voltage +30%, -35%. This feature is designed to avoid contactor coil failure during brown out / low line conditions and allow for input single phase operation when in the VFD mode. Designs that will not allow input single phase operation in the VFD mode are not acceptable.
5. Motor protection from single phase power conditions - the bypass system must be able to detect a single phase input power condition while running in bypass, disengage the motor in a controlled fashion, and give a single phase input power indication. Bypass systems not incorporating single phase protection in bypass mode are not acceptable.

6. The bypass system shall be designed for stand-alone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed. Bypass systems that do not maintain full functionality with the drive removed are not acceptable.
7. Serial communications - the bypass shall be capable of being monitored and / or controlled via serial communications. On-board communications protocols shall include ModBus RTU; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet MS/TP.
8. The user shall be able to select the text to be displayed on the keypad when an external safety opens. Example text display indications include “FireStat”, “FreezStat”, “Over pressure” and “Low suction”. The user shall also be able to determine which of the four (4) safety contacts is open over the serial communications connection.
9. Smoke Control Override Mode (Override 1) - The bypass shall include a dedicated digital input that will transfer the motor from VFD mode to Bypass mode upon receipt of a dry contact closure from the Fire / Smoke Control System. The Smoke Control Override Mode action is not programmable and will always function as described in the bypass User’s Manual documentation. In this mode, the system will ignore low priority safeties and acknowledge high priority safeties. All keypad control, serial communications control, and normal customer start / stop control inputs will be disregarded. This Smoke Control Mode shall be designed to meet the intent of UL864/UUKL.
10. Fireman’s Override Mode (Override 2) - the bypass shall include a second, programmable override input which will allow the user to configure the unit to acknowledge some digital inputs, all digital inputs, ignore digital inputs or any combination of the above. This programmability allows the user to program the bypass unit to react in whatever manner the local Authority Having Jurisdiction (AHJ) requires. The Override 2 action may be programmed for “Run-to-Destruction”. The user may also force the unit into Override 2 via the serial communications link.

PART 3 - EXECUTION

3.1 RESPONSIBILITIES

A. Unless noted otherwise, VFD's shall be furnished by the temperature control contractor, and installed by the electrician.

3.2 INSTALLATION

A. Installation shall be the responsibility of the mechanical contractor.

B. Power wiring shall be completed by the electrical contractor, to NEC code 430.122 wiring requirements based on the VFD input current.

C. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.3 START-UP

A. Factory start-up shall be provided for each drive by a factory authorized service center.

3.4 PRODUCT SUPPORT

A. Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available at both the specifying and installation locations. A toll free 24/365 technical support line connected to factory support personnel located in the US shall be available. Technical support offered only through the local sales office is not acceptable.

3.5 WARRANTY

A. The VFD Product Warranty shall be 36 months from the date of factory shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available.

END OF SECTION

SECTION 23 09 23

DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks 2020, with Errata and Amendments (2022).

B. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests 2019h.

1.2 INTEGRATION

A. Definitions

1. Integration

a. Systems Integration is the process of linking different manufacturers' equipment together into one network for the purposes of controlling the equipment by reading and writing control points.

2. BACnet

a. A communication protocol for building automation and control (BAC) networks that use the ASHRAE, ANSI, and ISO 16484-5 standards protocol.

3. BACnet/MSTP

a. In a Master-Slave/Token Passing Protocol, devices are connected using EIA-485 serial cables in a daisy-chain fashion and are classified as master or slave devices. Typically connected to the building automation system.

4. BACnet/IP

a. This method of communication connects devices via IP addresses, where the systems are connected via cloud-based software or virtual private networks (VPNs). Typical directly wired to the owner's network using CAT5 or CAT6 cable.

5. Factory-Authorized Equipment Startup Technician

a. The person, trained and authorized by the equipment manufacturer, who is responsible for the startup of the mechanical equipment.

6. Factory-Authorized Integration Startup Technician

a. The person, trained and authorized by the equipment manufacturer, who is responsible for the startup of the Integration. The Factory-Authorized Equipment Startup Technician and the Factory-Authorized Integration Startup Technician may be the same individual, if properly certified.

7. Installing Contractor

a. The contractor responsible for purchasing and installing the equipment.

8. Firmware

a. A specific class of computer software that provides low-level control for a device's specific hardware.

1.3 SUBMITTALS

A. See Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each system component and software module.

C. Shop Drawings:

1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.

2. List connected data points, including connected control unit and input device.

3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.

4. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

5. Indicate description and sequence of operation of operating, user, and application software.

D. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

E. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.

1. Revise shop drawings to reflect actual installation and operating sequences.

F. Operation and Maintenance Data:

1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.

2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.

3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 10 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum 10 years of documented experience.

1.5 WARRANTY

A. See Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Substantial Completion.

C. Provide five year manufacturer's warranty for field programmable micro-processor based units.

PART 2 - PRODUCTS

2.1 INSTALLERS

A. All temperature control work shall be an extension of the existing Automated Logic BAS by Automated Logic (CCG Automation).

B. Contact Brian Starr

1. Email: brian.starr@carrier.com
2. Phone: (330) 659-5082

2.2 MANUFACTURERS

A. Automated Logic WebCTRL

2.3 SYSTEM DESCRIPTION

A. Scope: Furnish all labor, materials and equipment necessary for a complete and operating Building Management System (BMS), utilizing Direct Digital Controls as shown on the drawings and as described herein. Drawings are diagrammatic only. All controllers furnished in this section shall communicate on a peer-to-peer bus over an open protocol bus (Examples: LonTalk, BACnet, MODBUS).

1. The intent of this specification is to provide a system that is consistent with BMS systems throughout the owner's facilities running the Niagara 4 Framework.
2. System architecture shall fully support a multi-vendor environment and be able to integrate third party systems via existing vendor protocols including, as a minimum, LonTalk, BACnet and MODBUS.
3. System architecture shall provide secure Web access using any of the current versions of Microsoft Internet Explorer, Mozilla Firefox, or Google Chrome browsers from any computer on the owner's LAN.
4. All control devices furnished with this Section shall be programmable directly from the Niagara 4 Workbench embedded toolset upon completion of this project. The use of configurable or programmable controllers that require additional software tools for post-installation maintenance shall not be acceptable.
5. Any control vendor that shall provide additional BMS server software shall be unacceptable. Only systems that utilize the Niagara 4 Framework shall satisfy the requirements of this section.
6. The BMS server shall host all graphic files for the control system. All graphics and navigation schemes for this project shall match those that are on the existing campus NiagaraAX or Niagara 4 Framework server.
7. A laptop computer including engineering/programming software to modify Operating System Server BMS programs and graphics shall be included.
8. Owner shall receive all Administrator level login and passwords for engineering toolset at first training session. The Owner shall have full licensing and full access rights for all network management, operating system server, engineering and programming software required for the ongoing maintenance and operation of the BMS.
9. OPEN NIC STATEMENTS - All Niagara 4 software licenses shall have the following NiCS: "accept.station.in=*"; "accept.station.out=*"and "accept.wb.in=*"and "accept.wb.out=*". All open NIC statements shall follow Niagara Open NIC specifications.

10. All JACE hardware licenses and certificates shall be stored on local MicroSD memory card employing encrypted "safe boot" technology.

11. To ensure quality, any JACE 3E, 6E, or 7 hardware products used on this project shall come through the Tridium Richmond, VA shipping facility. JACE hardware products not meeting this requirement will not be allowed.

2.4 OPERATOR INTERFACE

A. PC Based Work Station:

1. Connected to server for full access to all system information.

B. Workstation, controllers, and control backbone to communicate using BACnet protocol and addressing.

C. BACnet protocol to comply with ASHRAE Std 135.

D. Hardware:

2.5 CONTROLLERS

A. BUILDING CONTROLLERS

1. General:

a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.

b. Provide sufficient memory to support controller's operating system, database, and programming requirements.

c. Share data between networked controllers.

d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.

e. Utilize real-time clock for scheduling.

f. Continuously check processor status and memory circuits for abnormal operation.

g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.

h. Communication with other network devices to be based on assigned protocol.

2. Communication:

a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.

b. Perform routing when connected to a network of custom application and application specific controllers.

c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:

a. Outdoors and/or in Wet Ambient Conditions:

1). Mount within waterproof enclosures.

2). Rated for operation at 40 to 150 degrees F.

b. Conditioned Space:

1). Mount within dustproof enclosures.

2). Rated for operation at 32 to 120 degrees F.

4. Provisions for Serviceability:

a. Diagnostic LEDs for power, communication, and processor.

b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.

6. Power and Noise Immunity:

a. Maintain operation at 90 to 110 percent of nominal voltage rating.

b. Perform orderly shutdown below 80 percent of nominal voltage.

c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

B. CUSTOM APPLICATION CONTROLLERS

1. General:

a. Provide sufficient memory to support controller's operating system, database, and programming requirements.

b. Share data between networked, microprocessor based controllers.

c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.

d. Utilize real-time clock for scheduling.

e. Continuously check processor status and memory circuits for abnormal operation.

f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.

g. Communication with other network devices to be based on assigned protocol.

2. Communication:

a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.

b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:

a. Outdoors and/or in Wet Ambient Conditions:

1). Mount within waterproof enclosures.

2). Rated for operation at 40 to 150 degrees F.

b. Conditioned Space:

1). Mount within dustproof enclosures.

2). Rated for operation at 32 to 120 degrees F.

4. Provisions for Serviceability:

a. Diagnostic LED's for power, communication, and processor.

b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.

6. Power and Noise Immunity:

a. Maintain operation at 90 to 110 percent of nominal voltage rating.

b. Perform orderly shutdown below 80 percent of nominal voltage.

c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

C. APPLICATION SPECIFIC CONTROLLERS

1. General:

a. Not fully user programmable, microprocessor based controllers dedicated to control specific equipment.

b. Customized for operation within the confines of equipment served.

c. Communication with other network devices to be based on assigned protocol.

2. Communication:

a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.

b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:

a. Outdoors and/or in Wet Ambient Conditions:

1). Mount within waterproof enclosures.

2). Rated for operation at 40 to 150 degrees F.

b. Conditioned Space:

1). Mount within dustproof enclosures.

2). Rated for operation at 32 to 120 degrees F.

4. Provisions for Serviceability:

a. Diagnostic LEDs for power, communication, and processor.

b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.

6. Power and Noise Immunity:

a. Maintain operation at 90 to 110 percent of nominal voltage rating.

b. Perform orderly shutdown below 80 percent of nominal voltage.

c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

D. INPUT/OUTPUT INTERFACE

1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:
    a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
    b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:
    a. Allow monitoring of On/Off signals from remote devices.
    b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
    c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
    a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
    b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
    a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
    b. Outputs provided with three position (On/Off/Auto) override switches.
    c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
    a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
    b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
    c. Drift to not exceed 0.4 percent of range per year.
8. Tri State Outputs:
    a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
    b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
        1). Duct mounted heating coils.
        2). Zone dampers.
        3). Radiation.

c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

9. System Object Capacity:

a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.

b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.6 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies:

1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.

2. Limit connected loads to 80 percent of rated capacity.

3. Match DC power supply to current output and voltage requirements.

4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.

5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.

6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.

7. Operational Ambient Conditions: 32 to 120 degrees F.

8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD 810 for shock and vibration.

9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:

1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.

2. Minimum surge protection attributes:

a. Dielectric strength of 1000 volts minimum.

b. Response time of 10 nanoseconds or less.

c. Transverse mode noise attenuation of 65 dB or greater.

d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.7 LOCAL AREA NETWORK (LAN)

A. Provide communication between control units over local area network (LAN).

B. LAN Capacity: Not less than 60 stations or nodes.

C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.

D. LAN Data Speed: Minimum 19.2 Kb.

E. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.

F. Transmission Median: Fiber optic or single pair of solid 24 gage twisted, shielded copper cable.

G. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.8 SYSTEM SOFTWARE

A. Operating System:

1. Concurrent, multi-tasking capability.
    a. Common Software Applications Supported: Microsoft Excel.
    b. Acceptable Operating Systems: Coordinate with Owner.
2. System Graphics:
    a. Allow up to 10 graphic screens, simultaneously displayed for comparison and monitoring of system status.
    b. Animation displayed by shifting image files based on object status.
    c. Provide method for operator with password to perform the following:
        1). Move between, change size, and change location of graphic displays.
        2). Modify on-line.
        3). Add, delete, or change dynamic objects consisting of:
            a). Analog and binary values.
            b). Dynamic text.
            c). Static text.
            d). Animation files.
3. Custom Graphics Generation Package:
    a. Create, modify, and save graphic files and visio format graphics in PCX formats.
    b. HTML graphics to support web browser compatible formats.
    c. Capture or convert graphics from AutoCAD.
4. Standard HVAC Graphics Library:
    a. HVAC Equipment:
        1). Chillers.
        2). Boilers.
        3). Air Handlers.
        4). Terminal HVAC Units.
        5). Fan Coil Units.
        6). Unit Ventilators.
        7). Other equipment as applicable to the project.
    b. Ancillary Equipment:

B. Workstation System Applications:

1. Automatic System Database Save and Restore Functions:
    a. Current database copy of each Building Controller is automatically stored on hard disk.
    b. Automatic update occurs upon change in any system panel.
    c. In the event of database loss in any system panel, the first workstation to detect the loss automatically restores the database for that panel unless disabled by the operator.
2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
    a. Save database from any system panel.
    b. Clear a panel database.
    c. Initiate a download of a specified database to any system panel.
3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
4. On-line Help:
    a. Context-sensitive system assists operator in operation and editing.
    b. Available for all applications.
    c. Relevant screen data provided for particular screen display.
    d. Additional help available via hypertext.
5. Security:
    a. Operator log-on requires user name and password to view, edit, add, or delete data.
    b. System security selectable for each operator.
    c. System supervisor sets passwords and security levels for all other operators.
    d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.
    e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
    f. All system security data stored in encrypted format.
6. System Diagnostics:
    a. Operations Automatically Monitored:
        1). Workstations.
        2). Printers.
        3). Modems.
        4). Network connections.
        5). Building management panels.
        6). Controllers.
    b. Device failure is annunciated to the operator.
7. Alarm Processing:

a. All system objects are configurable to "alarm in" and "alarm out" of normal state.

b. Configurable Objects:

1). Alarm limits.

2). Alarm limit differentials.

3). States.

4). Reactions for each object.

8. Alarm Messages:

a. Descriptor: English language.

b. Recognizable Features:

1). Source.

2). Location.

3). Nature.

9. Configurable Alarm Reactions by Workstation and Time of Day:

a. Logging.

b. Printing.

c. Starting programs.

d. Displaying messages.

e. Dialing out to remote locations.

f. Paging.

g. Providing audible annunciation.

h. Displaying specific system graphics.

10. Custom Trend Logs:

a. Definable for any data object in the system including interval, start time, and stop time.

b. Trend Data:

1). Sampled and stored on the building controller panel.

2). Archivable on hard disk.

3). Retrievable for use in reports, spreadsheets and standard database programs.

4). Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.

5). Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.

11. Alarm and Event Log:

a. View all system alarms and change of states from any system location.

b. Events listed chronologically.

c. Operator with proper security acknowledges and clears alarms.

d. Alarms not cleared by operator are archived to the workstation hard disk.

12. Object, Property Status and Control:
    a. Provide a method to view, edit if applicable, the status of any object and property in the system.
    b. Status Available by the Following Methods:
        1). Menu.
        2). Graphics.
        3). Custom Programs.
13. Reports and Logs:
    a. Reporting Package:
        1). Allows operator to select, modify, or create reports.
        2). Definable as to data content, format, interval, and date.
        3). Archivable to hard disk.
    b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
    c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
    d. Set to be printed on operator command or specific time(s).
14. Reports:
    a. Standard:
        1). Objects with current values.
        2). Current alarms not locked out.
        3). Disabled and overridden objects, points and SNVTs.
        4). Objects in manual or automatic alarm lockout.
        5). Objects in alarm lockout currently in alarm.
        6). Logs:
            a). Alarm History.
            b). System messages.
            c). System events.
            d). Trends.
    b. Custom:
        1). Daily.
        2). Weekly.
        3). Monthly.
        4). Annual.
        5). Time and date stamped.
        6). Title.
        7). Facility name.
    c. Tenant Override:

1). Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.

2). Annual report showing override usage on a monthly basis.

d. Electrical, Fuel, and Weather:

1). Electrical Meter(s):

a). Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.

b). Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.

2). Fuel Meter(s):

a). Monthly showing daily natural gas consumption for each meter.

b). Annual summary showing monthly consumption for each meter.

3). Weather:

a). Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.

C. Workstation Applications Editors:

1. Provide editing software for each system application at PC workstation.
2. Downloaded application is executed at controller panel.
3. Full screen editor for each application allows operator to view and change:
   a. Configuration.
   b. Name.
   c. Control parameters.
   d. Set-points.
4. Scheduling:
   a. Monthly calendar indicates schedules, holidays, and exceptions.
   b. Allows several related objects to be scheduled and copied to other objects or dates.
   c. Start and stop times adjustable from master schedule.
5. Custom Application Programming:
   a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
   b. Programming Features:
      1). English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.
      2). Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
      3). Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.

4). Allows the development of independently, executing, program modules designed to enable and disable other modules.

5). Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.

6). Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.

7). Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.

8). Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values cab be used in IF/THEN comparisons, calculations, programming statement logic, etc.

9). Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

2.9 CONTROLLER SOFTWARE

A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.

B. System Security:

1. User access secured via user passwords and user names.
2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
3. User Log On/Log Off attempts are recorded.
4. Automatic Log Off occurs following the last keystroke after a user defined delay time.

C. Object or Object Group Scheduling:

1. Weekly Schedules Based on Separate, Daily Schedules:
   a. Include start, stop, optimal stop, and night economizer.
   b. 10 events maximum per schedule.
   c. Start/stop times adjustable for each group object.
2. Holiday or Special Schedules:
   a. Capability to define up to 99 schedules.
   b. Repeated annually.
   c. Length of each period is operator defined.

D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.

E. Alarms:

1. Binary object is set to alarm based on the operator specified state.
2. Analog object to have high/low alarm limits.
3. All alarming is capable of being automatically and manually disabled.

4. Alarm Reporting:
    a. Operator determines action to be taken for alarm event.
    b. Alarms to be routed to appropriate workstation.
    c. Reporting Options:

F. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

G. Sequencing: Application software based upon specified sequences of operation in Section 23 09 93.

H. PID Control Characteristics:
1. Direct or reverse action.
2. Anti-windup.
3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
4. User selectable controlled variable, set-point, and PED gains.

I. Staggered Start Application:
1. Prevents all controlled equipment from simultaneously restarting after power outage.
2. Order of equipment startup is user selectable.

J. Energy Calculations:
1. Accumulated instantaneous power or flow rates are converted to energy use data.
2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

K. Anti-Short Cycling:
1. All binary output objects protected from short-cycling.
2. Allows minimum on-time and off-time to be selected.

L. On-Off Control with Differential:
1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

M. Run-Time Totalization:
1. Totalize run-times for all binary input objects.
2. Provides operator with capability to assign high run-time alarm.

2.10 HVAC CONTROL PROGRAMS

A. Optimal Run Time:
1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.

3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
4. Use outside air temperature to determine early shut down with ventilation override.
5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.

B. Supply Air Reset:

1. Monitor heating and cooling loads in building spaces, terminal reheat systems, both hot deck and cold deck temperatures on dual duct and multizone systems, single zone unit discharge temperatures.
2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
   a. Raising cooling temperatures to highest possible value.
   b. Reducing heating temperatures to lowest possible level.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

3.2 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 09 93.

C. Provide conduit and electrical wiring. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.3 COMMISSIONING

A. Refer to commissioning specification.

3.4 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

B. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 2 day period.

3.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate complete and operating system to Owner.

3.6 MAINTENANCE

A. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.

B. Provide four complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

C. Provide complete service of systems, including call backs. Make minimum of 3 complete normal inspections of approximately 4 hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

END OF SECTION

SECTION 23 09 93

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.

1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.

2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in the contract documents.

3. Include at least the following sequences:

a. Start-up.

b. Warm-up mode.

c. Normal operating mode.

d. Unoccupied mode.

e. Shutdown.

f. Capacity control sequences and equipment staging.

g. Temperature and pressure control, such as setbacks, setups, resets, etc.

h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.

i. Effects of power or equipment failure with all standby component functions.

j. Sequences for all alarms and emergency shut downs.

k. Seasonal operational differences and recommendations.

l. Interactions and interlocks with other systems.

4. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.

C. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.

1. Label with settings, adjustable range of control and limits.

2. Include flow diagrams for each control system, graphically depicting control logic.

3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.

4. Include a key to all abbreviations.

D. Points List: Submit list of all control points indicating at least the following for each point.

1. Name of controlled system.
2. Point abbreviation.
3. Point description; such as dry bulb temperature, airflow, etc.
4. Display unit.
5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
8. Calculated point (Yes / No); i.e. a “virtual” point generated from calculations of other point values.

E. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

1.2 QUALITY ASSURANCE

A. Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the State in which the Project is located.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 AIR TERMINAL UNITS

A. Single-duct Variable Volume:

1. Cooling with Reheat (Dual Maximum):

a. When the zone is in the cooling mode, the cooling loop output is mapped to the airflow setpoint from the cooling maximum to the minimum airflow setpoints. The hot water valve is closed.

b. When the zone is in the dead band mode, the airflow setpoint shall be the minimum airflow setpoint. The hot water valve is closed.

1). From 0%-50% loop signal, the heating loop output shall reset the discharge temperature from supply air temperature setpoint (e.g., 55 F) to 90 F. Note the upper temperature is limited to prevent stratification during heating.

2). From 50%-100% loop signal, the heating loop output shall reset the zone airflow setpoint from the minimum airflow setpoint to the maximum heating airflow setpoint. The supply air discharge temperature remains at 90 F.

c. The hot water valve shall be modulated using a PI control loop to maintain the discharge temperature at setpoint. Note that directly controlling the hot water valve from the zone temperature PI loop is not acceptable since it will not allow

supply air temperature to be under control and limited in temperature to prevent stratification.

d. The VAV damper shall be modulated to maintain the measured airflow at setpoint.

3.2 HEATING WATER PUMPS

A. System water distribution pump alteration

1. Distribution pumps alternate to equalize equipment runtime. The lead and standby pump shall be alternated on a weekly basis.

B. Existing Heating Boiler Control Modifications

1. Modify existing heating water system / boiler plant operations to accommodate new inputs (calls for heating) from loads served by new heating water pumps.

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.

D. ASME B16.51 - Copper and Copper Alloy Press-Connect Pressure Fittings 2021.

E. ASME B31.9 - Building Services Piping 2020.

F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

G. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service 2019a.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2019.

J. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

K. ASTM B32 - Standard Specification for Solder Metal 2020.

L. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.

N. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.

O. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992 (Reapproved 2022).

P. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications 2007 (Reapproved 2019).

Q. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

R. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

S. AWWA C606 - Grooved and Shouldered Joints 2015.

T. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Product Data:

1. Include data on pipe materials, pipe fittings, valves, and accessories.

2. Indicate valve data and ratings.

3. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

C. Project Record Documents: Record actual locations of valves.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

B. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

C. Coupling Manufacturer:

1. Perform on-site training by factory-trained representative to the Contractor's field personnel in the proper use of grooving tools and installation of grooved joint products.

2. Periodic job site visits by factory-trained representative to ensure best practices in grooved joint installation.

3. A distributor's representative is not considered qualified to perform the training.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective coating on cast iron and steel valves.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:

1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.

2. Use non-conducting dielectric connections whenever jointing dissimilar metals.

3. Grooved mechanical joints may be used in any location.

a. Grooved mechanical connections and joints comply with AWWA C606.

1). Ductile Iron: Comply with ASTM A536, Grade 65-45-12.

2). Steel: Comply with ASTM A106/A106M, Grade B or ASTM A53/A53M.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.

D. Valves: Provide valves where indicated:

1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with chain and cap; pipe to nearest floor drain where indicated on drawings.

2.2 HEATING WATER, ABOVE GRADE

A. Steel Pipe up to 2.5 inch: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:

1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.

2. Threaded Joints: ASME B16.3, malleable iron fittings.

3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Steel Pipe Sizes 2.5 inch and greater:

1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.

2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube up to 2.5 inch: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:

1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.

a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.

2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.51, utilizing EPDM, nontoxic synthetic rubber sealing elements.

a. Manufacturers:

1). Grinnell Products, a Tyco Business

2). Viega LLC

2.3 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:

1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:

C. PVC Pipe (less than 130F liquid temperature): ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.

1. Fittings: ASTM D2466 or D2467, PVC.

2. Joints: Solvent welded in accordance with ASTM D2855.

D. CPVC (boiler acidic condensate drain, temperature up to 200F): ASTM D2846, schedule 40

1. Fittings ASTM D2846

2. Joints: Solvent welded

E. Flexible Polypropylene tube (boiler acidic condensate drain, temperature up to 180F)

1. Translucent, rated for 87 psi and 220F

2.4 PIPE HANGERS AND SUPPORTS

A. Refer to specification section 23 05 29 Hangers and Supports for HVAC Piping and Equipment for additional information.

2.5 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:

1. Ferrous Piping: 150 psig malleable iron, threaded.

2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:

1. Ferrous Piping: 150 psig forged steel, slip-on.

2. Copper Piping: Bronze.

3. Gaskets: 1/16 inch thick preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

1. Dimensions and Testing: In accordance with AWWA C606.

2. Mechanical Couplings: Comply with ASTM F1476.

3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.

4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

D. Dielectric Connections:

1. Waterways:

a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.

b. Dry insulation barrier able to withstand 600 volt breakdown test.

c. Construct of galvanized steel with threaded end connections to match connecting piping.

d. Suitable for the required operating pressures and temperatures.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems. Refer to Section 23 25 00 for additional requirements.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Sleeve pipe passing through partitions, walls and floors.

G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

H. Slope piping and arrange to drain at low points.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.

1. Use flexible couplings in expansion loops.

J. Grooved Joints:

K. Pipe Hangers and Supports:

1. Refer to specification section 23 05 29 Hangers and Supports for HVAC Piping and Equipment for additional information.

L. Provide access doors where valves and fittings are not exposed.

M. Use eccentric reducers to maintain top of pipe level.

N. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

O. Install valves with stems upright or horizontal, not inverted.

3.3 SCHEDULES

A. Hanger Spacing:

1. Refer to specification section 23 05 29 Hangers and Supports for HVAC Piping and Equipment for additional information.

END OF SECTION

SECTION 23 21 14

HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2021.

1.2 SUBMITTALS

A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

B. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

PART 2 - PRODUCTS

2.1 AIR VENTS

A. Manufacturers:

1. Armstrong International, Inc
2. ITT Bell & Gossett
3. Taco, Inc

B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass ball valve at top of chamber (needle valves not permitted).

C. Float Type:

1. Brass or body, solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

2.2 STRAINERS

A. Manufacturers:

1. Armstrong International, Inc
2. Flexicraft Industries
3. Grinnell Products, a Tyco Business
4. The Metraflex Company
5. Mueller
6. Watson McDaniel
7. Watts

B. Size 2 inch and Under:

1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:

1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 1/16 inch stainless steel perforated screen.

D. Size 5 inch and Larger:

1. Provide flanged or grooved iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.3 PUMP CONNECTORS

A. Manufacturers:

1. Metraflex Co.
2. Flexonics, Inc.
3. Keflex, Inc.
4. Twin City Hose

B. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.

1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
2. Accommodate the Following:
   a. Axial Deflection in Compression and Expansion
   b. Lateral Movement
   c. Angular Rotation: 15 degrees.
   d. Force developed by 1.5 times specified maximum allowable operating pressure.
3. End Connections: Flanged ductile iron; complying with ASME B16.1 Class 125.
4. Provide pump connector with integral vanes to reduce turbulent flow.
5. Provide necessary accessories including, but not limited to, swivel joints.

2.4 COMBINATION PUMP DISCHARGE VALVES (I.E. TRIPLE DUTY VALVES)

A. Manufacturers:

1. Crane Co.
2. Taco, Inc
3. Victaulic Company of America
4. Bell & Gossett
5. Tour & Andersson

B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psi operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.5 COMBINATION FLOW CONTROLS

A. Manufacturers:

1. Armstrong International
2. ITT Bell & Gossett
3. Taco Inc
4. Tour & Andersson

B. Construction: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

D. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.

1. Accessories: In-line strainer on inlet and ball valve on outlet.

2.6 PRESSURE INDEPENDENT BALANCE VALVES

A. Manufacturers:

1. Griswold Controls LLC; PIC-V
2. Tour & Andersson
3. Flow Design

B. Size 2 inch and Smaller:

1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
2. Metal construction materials consist of bronze or brass.
3. Non-metal construction materials consist of Teflon or EPDM.

C. Size 2.5 inch and Larger:

1. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged or grooved connections.
2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, or EPDM.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Provide manual air vents at system high points and as indicated.

C. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

D. Provide ball valve and hose connection on strainer blow down connection.

E. Provide pump suction diffuser fitting on suction side of base mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.

F. Support pump fittings with floor mounted pipe and flange supports.

G. Pipe relief valve outlet to nearest floor drain. Support outlet piping independent of valve, such that the pipe weight does not induce stress on the valve.

END OF SECTION

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. UL 778 - Standard for Motor-Operated Water Pumps Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Product Requirements, for additional provisions.

2. Extra Pump Seals: 1 for each type and size of pump.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Armstrong Fluid Technology, Inc.

B. Bell & Gossett, a Xylem Inc. brand

C. Taco

2.2 HVAC PUMPS - GENERAL

A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Base Mounted Pumps: Laser Aligned by qualified millwright.

C. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

2.3 VERTICAL IN-LINE PUMPS

A. Type: Vertical, single stage, close coupled, radially or horizontally split casing, for in-line mounting, for 175 psi working pressure.

B. Casing: Cast iron, with suction and discharge gauge port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.

D. Shaft: Stainless steel with stainless steel impeller cap screw or nut and bronze sleeve.

E. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close-coupled or base-mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

D. Provide drains for bases and seals, piped to and discharging into floor drains; cut pipe termination at a 45 deg angle.

E. Check, laser align, and certify alignment of base-mounted pumps prior to start-up.

F. Install close-coupled and base-mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place.

G. Lubricate pumps before start-up.

END OF SECTION

SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 - GENERAL

1.1 SUBMITTALS

A. Administrative Requirements, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

E. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Product Requirements, for additional provisions.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 10 years of experience and approved by manufacturer. The mechanical contractor shall not be permitted to perform water treatment work unless they have a special division that is dedicated to such work for at least 10 years.

PART 2 - PRODUCTS

2.1 ACCEPTABLE VENDORS

A. ChemTreat

B. ChemAqua

C. GLA Water Treatment

D. Bond Chemical

2.2 MATERIALS

A. System Cleaner:

1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.

2. Biocide chlorine release agents such as sodium hypochlorite or calcium hypochlorite or microbiocides such as quaternary ammonia compounds, tributyltin oxide, methylene bis (thiocyanate).

B. Closed System Treatment (Water):

1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.

2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.

3. Conductivity enhancers; phosphates or phosphonates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.

3.2 CLEANING SEQUENCE

A. Concentration:

1. As recommended by manufacturer.

B. Hot Water Heating Systems:

1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.

2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.

3. Circulate for 6 hours at design temperatures, then drain.

4. Refill with clean water and repeat until system cleaner is removed.

C. Use neutralizer agents on recommendation of system cleaner supplier and approval of Engineer.

D. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.

E. Remove, clean, and replace strainer screens.

F. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 CLOSED SYSTEM TREATMENT

A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.

B. Introduce closed system treatment through bypass feeder when required or indicated by test.

C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.5 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.

1. Provide minimum of four hours of instruction for two people.

2. Have operation and maintenance data prepared and available for review during training.

3. Conduct training using actual equipment after treated system has been put into full operation.

B. Photographs

1. After flushing and cleaning of system, provide to the engineer photographs of cleaned strainer mesh, suction diffuser basket/mesh, start-up screens, etc. to engineer for all hydronic and steam systems.

3.6 MAINTENANCE

A. Provide a separate maintenance contract for specified maintenance service.

B. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.

C. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Owner.

D. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.

E. Provide monthly technical service visits to perform field inspections and make water analysis on-site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.

F. Provide laboratory and technical assistance services during this maintenance period.

G. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.

H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2021.

I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

J. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines 2001.

K. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual 2012.

L. UL 1978 - Grease Ducts Current Edition, Including All Revisions.

M. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for 4" pressure class and higher systems.

C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 10 years of documented experience.

1.4 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 - PRODUCTS

2.1 DUCT ASSEMBLIES

A. Provide ductwork as described in the following Ductwork Construction Matrix per service and location.

Duct Construction Matrix

Service	Ductwork Type	Pressure Class	Location	Material	Leakage Class (Rec / Round)	Seal Class	Notes
Supply Air	**Medium Pressure**	**4"**	**Between RTU / AHU and Terminal Boxes / Balancing Dampers**	**Galvanized Steel**	**6 / 3**	**A**	**1, 2, 3**
Supply Air	**Low Pressure**	**2"**	**Between Terminal Boxes / Balancing Dampers and Diffusers**	**Galvanized Steel**	**12 / 6**	**A**	**1, 2, 3**
Return Air	**Low Pressure**	**2"**	**Between Grilles and AHU / RTU**	**Galvanized Steel**	**12 / 6**	**A**	**1, 2, 3**

The following notes apply to the above Ductwork Construction Table above:

1. Construct ductwork in accordance with NFPA 90 and SMACNA DCS Standards.
2. Leakage Class and Seal Class per SMACNA HVAC Air Duct Leakage Test Manual.
3. Maximum Total Allowable Leakage (percent) / Minimum Test Pressure (inch water gauge) for system type listed. Test pressure shall not exceed pressure rating of duct.
   a. **2.0% / 0.5”** - Fractional HP Fan systems, fan coils, small exhaust / supply fans.
   b. **2.0% / 1.0”** - Small systems, Split DX Systems, generally under 2,000 CFM.
   c. **2.0% / 1.0”** - VAV and CAV Terminal Boxes / Air Valves including associated downstream duct.
   d. **2.0% / 2.0”** - Single zone, multi-zone, low pressure VAV and CAV systems, return ducts, exhaust ducts.
   e. **1.0% / 3.0”** - All constant volume ducts in chases and concealed spaces, main return ducts on VAV and CAV systems, main ducts on exhaust / supply systems.
   f. **1.0% / 4.0”** - Supply ducts on VAV and CAV systems.

2.2 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

C. Stainless Steel for Ducts: ASTM A666, Type 304.

D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.

2. VOC Content: Not more than 250 g/L, excluding water.

3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

E. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.3 DUCTWORK FABRICATION

A. Mechanical contractor shall fabricate ductwork in accordance with SMACNA (DCS) and as indicated on project drawings.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.

C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

G. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, transition duct to match louver area. Use same material as duct and seal to louver frame and duct.

2.4 MANUFACTURED DUCTWORK AND FITTINGS

A. When the mechanical contractor does not wish to fabricate or is not capable of fabricating their own ductwork, commercially manufactured ductwork meeting the following criteria shall be considered acceptable.

B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.

1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.

2. Pressure Rating: 4 inches WG positive and 1.0 inches WG negative.

3. Maximum Velocity: 4000 fpm.

4. Temperature Range: Minus 10 degrees F to 160 degrees F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Flexible Ducts: Connect to metal ducts with draw bands.

E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Connect terminal units to supply ducts directly as detailed on the drawings.

I. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

J. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

K. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

END OF SECTION

SECTION 23 36 00

AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001, with Addenda (2011).

B. AHRI 880 (I-P) - Performance Rating of Air Terminals 2017.

C. ASHRAE Std 130 - Laboratory Methods of Testing Air Terminal Units 2016.

D. ASTM A492 - Standard Specification for Stainless Steel Rope Wire 1995 (Reapproved 2019).

E. ASTM A603 - Standard Specification for Metallic-Coated Steel Structural Wire Rope 2019.

F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.

G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.

J. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

K. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

L. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Current Edition, Including All Revisions.

1.2 SUBMITTALS

A. See Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.

E. Project Record Documents: Record actual locations of units and locations of access doors required for access of valving.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.3 WARRANTY

A. See Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for air terminal units.

PART 2 - PRODUCTS

2.1 SINGLE-DUCT, VARIABLE-VOLUME UNITS

A. Manufacturers:

1. Carrier Corp
2. Johnson Controls, Inc
3. Metalaire
4. Price Industries, Inc
5. Trane
6. Titus

B. General:

1. Factory-assembled, AHRI 880 (I-P) rated and bearing the AHRI seal, air volume control terminal with damper assembly, flow sensor, externally mounted volume controller, duct collars, and all required features.
2. Control box bearing identification, including but not necessarily limited to nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil (right or left hand) connection, where applicable.

C. Unit Casing:

1. Minimum 22 gage, 0.0299 inch galvanized steel.
   a. Casing leakage to meet ASHRAE Std 130.
2. Air Inlet Collar: Provide round, suitable for standard flexible duct sizes.
3. Unit Discharge: Rectangular, with slip-and-drive connections.
4. Acceptable Liners:
   a. 1/2 inch thick, coated, fibrous-glass complying with ASTM C1071.
      1). Secure with adhesive.
      2). Coat edges exposed to airstream with NFPA 90A approved sealant.
      3). Cover liner with non-porous foil.
   b. Liner not to contain pentabrominated diphenyl ether (CAS #32534-81-9) or octabrominated diphenyl ether.

D. Damper Assembly:

1. Heavy-gage, galvanized steel or extruded aluminum construction with solid steel, nickel-plated shaft pivoting on HDPE, self-lubricating bearings.
2. Provide integral position indicator or alternative method for indicating damper position over full range of 90 degrees.
3. Incorporate low leak damper blades for tight airflow shutoff.

E. Hot Water Heating Coil:

1. Coil Casing: Minimum 22 gage, 0.0299 inch galvanized steel, factory-installed on terminal discharge with rectangular outlet, duct connection type.
    a. Access Door: Gasketed and insulated located on bottom upstream of coil.
2. Coil Fins: Aluminum or aluminum plated fins, mechanically-bonded to seamless copper tubes.
    a. Select coil rows with ten fins-per-inch (max) to achieve desired heating capacity density.
3. Coil leak tested to minimum 350 psig.
4. Base performance data on tests run in accordance with AHRI 410 and units to bear AHRI 410 label.

F. Controls:

1. Airflow Sensor: Differential pressure airflow device measuring total, static, and wake pressures.
    a. Basis of Design: Price Industries, Inc; SP300 Air Flow Sensor.
        1). Plastic parts are fire-resistant, complying with UL 94.
        2). Provides accuracy within 5 percent with a 90 degree sheet metal elbow directly at the inlet of the assembly.
        3). Control tubing is protected by grommets at the wall of the air flow sensor's housing.
        4). Furnished with twelve total pressure sensing ports and a center averaging chamber that amplifies the sensed air flow signal.
        5). Provide velocity pressure sensor with a removable access section for maintenance.
    b. Signal accuracy: Plus/minus five percent throughout terminal operating range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditions are suitable for installation.

B. Verify that field measurements are as indicated on drawings.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. See drawings for the size(s) and duct location(s) of the air terminal units.

D. Provide ceiling access doors or locate units above easily removable ceiling components.

E. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.

F. Do not support from ductwork.

G. Connect to ductwork in accordance with Section 23 31 00.

3.3 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to zero percent full flow.

3.4 CLEANING

A. Vacuum clean coils and inside of units.

B. Install new filters.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices 2021.

B. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers 2022.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.2 SUBMITTALS

A. See Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Project Record Documents: Record actual locations of air outlets and inlets.

1.3 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Krueger-HVAC, Division of Air System Components

B. Price Industries

C. Titus, a brand of Air Distribution Technologies

2.2 DIFFUSERS

A. Type: Provide type of diffuser indicated on drawing schedule. Diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.

B. Connections: As indicated on drawings.

C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type as indicated on architectural reflected ceiling plans. In plaster ceilings, provide plaster frame and ceiling frame.

D. Fabrication: steel or as indicated on drawings with baked enamel finish.

E. Color: white unless indicated otherwise on drawings.

F. Accessories: Provide duct mounted volume control damper as specified elsewhere or opposed blade damper with damper adjustable from diffuser face as indicated on drawings or where required if duct mounted balance damper is not practical to install in an accessible location.

1. provide insulation on top of diffuser.

2.3 SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.

B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.

C. Construction: Made of aluminum extrusions with factory enamel finish.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where required if duct mounted balance damper is not practical to install in an accessible location.

2.4 EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: As indicated on drawings or Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions , with factory baked enamel finish.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where required if duct mounted balance damper is not practical to install in an accessible location.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

D. Install diffusers to ductwork with air tight connection.

E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, if possible, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

F. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION

SECTION 23 82 00

CONVECTION AND RADIANT HEATING UNITS

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Current Edition.

1.2 SUBMITTALS

A. See Section 23 01 00 General HVAC Requirements for submittal procedures.

B. Product Data: Provide typical catalog of information including arrangements, rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings:

1. Indicate assembly, required clearances, and location and size of field connections.

2. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.

3. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

4. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.

D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

PART 2 - PRODUCTS

2.1 RADIANT CEILING PANELS

A. Manufacturers:

1. AERO TECH

2. AIRTEX

3. AIRTITE

4. RITTLING

B. General:

1. Panel: Aluminum sheet formed to panel dimensions per drawings. Panel shall be mounted in a ceiling grid per Architectural Plans.

2. Pipe: 0.50” I.D. nominal copper pipe bonded to the aluminum panel. Pipe shall have quantity of passes as indicated on drawings.

3. Insulation: 1” thick, 0.75 lb/ft3 fiberglass insulation provided with the panel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment exposed to finished areas after walls and ceilings are finished and painted.

B. Install all equipment per manufacturer’s published installation instructions.

3.2 SYSTEM STARTUP

A. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

B. Adjust for proper operation within manufacturer's published tolerances.

3.3 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

END OF SECTION