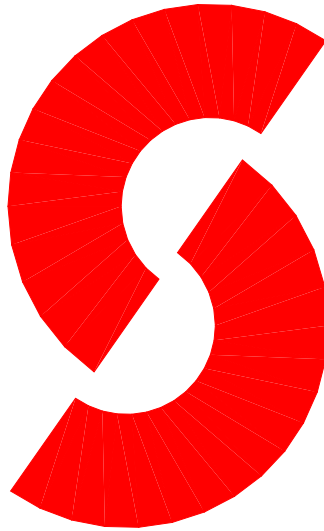


**PROJECT MANUAL**  
**FOR**  
**SINCLAIR COMMUNITY COLLEGE**  
**EMS Classroom & Sim Lab Bldg. 14**

**SINCLAIR PROJECT NO. FAC 24-28X**



**PREPARED BY:**

**SPGB Architects, LLC**  
**4333-A Tuller Road**  
**Dublin, Ohio 43017**

**In Association with**  
**HEAPY**  
**MECHANICAL ELECTRICAL COMMISSIONING TECHNOLOGY**  
**1400 WEST DOROTHY LANE**  
**DAYTON, OHIO 45409-1310**

**January 20, 2025**

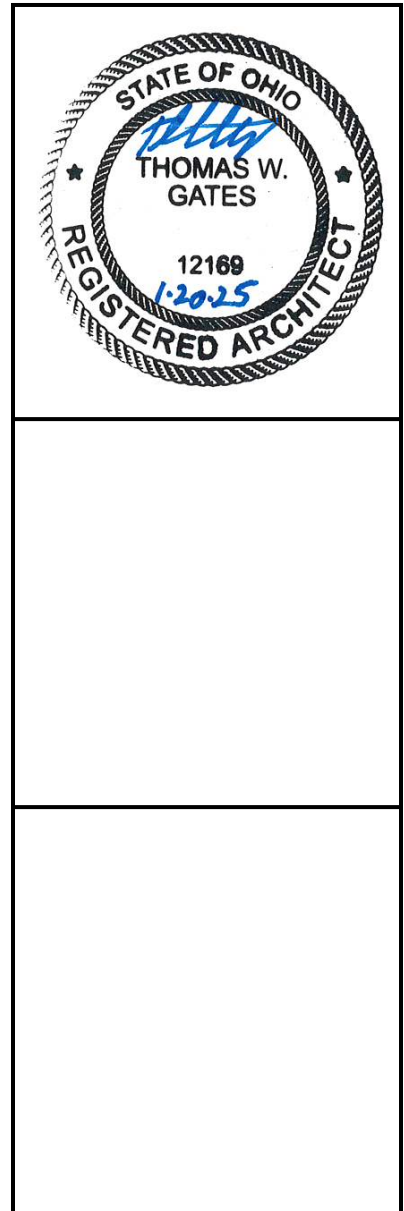
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**DOCUMENT 000107 - SEALS PAGE**

1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT: **SPGB Architects, LLC**  
9812169 – Thomas W. Gates, AIA  
Expires 12/31/2025



MECHANICAL  
ELECTRICAL  
& PLUMBING  
ENGINEER: **HEAPY**

END OF DOCUMENT 000107



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**END OF DOCUMENT**



# Document 00 10 00 - Solicitation (General Contracting / Electronic Bid) State of Ohio Standard Requirements for Public Facility Construction

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Electronic bids will be received by:

<https://bidexpress.com>

for the following Project:

Project FAC 24-28X/OFCC# SCC-002428X  
EMS Classrooms & Sim Lab Bldg. 14  
Sinclair College  
444 West Third Street  
Dayton OH 45402  
Montgomery County

in accordance with the Contract Documents prepared by:

SPGB Architects, LLC  
4333-A Tuller Road  
Dublin, OH 43017  
614-771-8963  
Mr. Thomas W. Gates, AIA  
[tgates@spgbarch.com](mailto:tgates@spgbarch.com)  
[www.spgbarch.com](http://www.spgbarch.com)

In compliance with Section 153.08 of the Ohio Revised Code and Section 153:1-8-01 of the Ohio Administrative Code, Bids for this Project are being received, opened, and published through electronic means using the State's electronic bidding service.

To access this Project through the electronic bidding service, you must first register at <https://bidexpress.com> by clicking on the "REGISTER FOR FREE" button and following the instructions. In order to bid, you must create and enable a digital ID within the service. This process requires the submission of notarized paperwork and may take up to five business days to complete. There are no fees to register, create and enable a digital ID, or to download bid documents. There is a small expense on a monthly or per bid basis to submit a bid. The electronic bidding service offers customer support that may be reached at 888.352.2439 or via email at [support@bidexpress.com](mailto:support@bidexpress.com).

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.

Prevailing Wage rates and 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 6.1.10** of the **Instructions to Bidders**.

The EDGE Participation Goal for the Project is **0.0 percent**.

For more information about EDGE certification, contact the State of Ohio, Department of Development, Minority Business Division at [www.minority.ohio.gov](http://www.minority.ohio.gov) or email [certifications@development.ohio.gov](mailto:certifications@development.ohio.gov).

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 electronic 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 Electronic 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**.

Electronic bids will be received for:

<u>Trade</u>	<u>Estimate</u>
<b>General Contract</b> .....	<b>\$597,600</b>
Alternate 1 .....	<b>\$ 5,330</b>
Alternate 2 .....	<b>\$ 21,275</b>

until **February 13, 2025**, at **2:00 p.m.**, when all Bids will be electronically opened. Bid tabulations will be posted no later than 5:00 p.m. on the day Bids are opened.

All Bidders are strongly encouraged to attend the Pre-Bid Meeting on **Wednesday, January 29, 2025**, at **10 a.m.** until approximately **11:00 a.m.** at the following location:

Bldg. 17, Conference Room 17140  
Sinclair College  
444 West Third Street  
Dayton, OH 45402

A walk-thru of the project site will occur immediately following the meeting.

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

The Contract Documents may be downloaded as electronic PDF files from the State’s electronic bidding service at <https://bidexpress.com> at no charge.

**END OF DOCUMENT**

# Document 00 21 13 - Instructions to Bidders (General Contracting / Electronic Bid) 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 electronic **Bid Form** is the time for Substantial Completion of all Work 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.

### 1.4 Use of the State's Electronic Bidding Software

1.4.1 The Bidder shall use the State's Electronic Bidding Software to submit its Bid for this Project. Paper Bids will not be accepted.

1.4.2 Bidders, Subcontractors, and Material Suppliers may download the Contract Documents as PDF files from the State's Electronic Bidding Software at no charge by registering and associating with a company at <https://bidexpress.com>.

1.4.3 Bidders are encouraged to create and obtain approval of their Digital ID well in advance of the bid deadline. Approval may take up to seven business days.

**1.4.4** Bidders are also encouraged to click the “Select for Bidding” link on the electronic **Bid Form** to be listed on the electronic Plan Holder’s list and submit payment to receive notifications regarding Addenda and other announcements.

**1.4.5** Subcontractors and Material Suppliers may view the electronic Plan Holder’s list to determine potential Bidders.

**1.4.6** Bidders, Subcontractors, and Material Suppliers are encouraged to attend a contractor webinar or contact the vendor’s help desk through the means identified at <https://bidexpress.com> to increase their knowledge of using the State’s Electronic Bidding Software.

## 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 the State's State's Electronic Bidding Software, 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 bid deadline.

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

## **2.6 Electronic Bid Form**

**2.6.1** Each Bid shall be submitted on the electronic **Bid Form** through the State's Electronic Bidding Software.

**2.6.1.1** All sections of the electronic **Bid Form**, including a completed "Bidder Affirmation and Disclosure" section 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 deadline, the Bidder must provide the information requested with its **Subcontractor and Material Supplier Declaration**.

**2.6.1.2** 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 spaces on the electronic **Bid Form**. The State's Electronic Bidding Software will identify any incomplete required fields.

**2.6.3** If the Bidder is a corporation, partnership, or sole proprietorship, an officer, partner or principal of the Bidder shall enter the legal name of the Bidder in the space provided on the electronic **Bid Form**. If the Bidder is a joint venture, an officer, partner or principal, as applicable, of each member of the joint venture shall enter the legal name of the applicable member in the space provided.

## 2.7 Allowances

**2.7.1** If Allowances are provided on the electronic **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 electronic **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 electronic **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 electronic **Bid Form**, the Bidder shall fill in the applicable space with a positive or negative bid amount 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 "\$0."

**2.9.1.2** Failure to make an 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 will indicate the Bidder's intent to increase the Base Bid by the amount entered in the applicable space.

**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 Electronic 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:

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

**2.10.1.2** The original unaltered Bid Guaranty shall be delivered to the Contracting Authority within 3 business days after the public bid opening as provided in Ohio Administrative Code ("OAC") Section 153:1-8-01(H).

**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 attached to the electronic **Bid Form**, 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 for this Project by attaching a fully completed **EDGE Affidavit** form 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 resubmitted through the State’s Electronic Bidding Software prior to the deadline for submission of Bids.

## **ARTICLE 3 - BID OPENING AND EVALUATION**

### **3.1 Delivery of Bid**

**3.1.1** The Bidder shall submit its Bid to the Contracting Authority prior to the time of the bid deadline.

**3.1.2** Bids that are submitted after the time of the bid deadline shall not be considered.

### 3.2 Bid Opening

**3.2.1** Electronic Bids shall be received until the time stated when all Bids shall be electronically opened and the Bid tabulation made public by posting on the State's Electronic Bidding Software.

**3.2.2** The posting of Bid tabulations 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 electronic **Bid Form** and its attachments are public records and shall be available for inspection, upon request, at any time after the bid deadline, except for any information that is not defined as a public record under Ohio law.

### 3.3 Bid Deadline Extension

**3.3.1** If an Addendum is issued within 72 hours prior to the published time for the bid deadline, excluding Saturdays, Sundays and legal holidays, the bid deadline shall be extended 7 days. If the Contracting Authority approves, the bid deadline 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 deadline, excluding Saturdays, Sundays and legal holidays, only the Contracting Authority may approve a revised bid deadline 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.

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**ARTICLE 4 - WITHDRAWAL OF BID****4.1 Withdrawal prior to Bid Opening**

**4.1.1** A Bidder may withdraw a Bid after submitting the Bid through the State's Electronic Bidding Software, provided the Bidder submits its request through the State's Electronic Bidding Software prior to the bid deadline.

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

**6.1.9 Required Notice of Unresolved Findings for Recovery.**

**6.1.9.1** 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.

**6.1.10 EDGE Program – Supporting Documentation Required.**

**6.1.10.1** 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.

**6.1.11** 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 of all Work. 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 electronic **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 22 00 - Supplementary Instructions (General Contracting) State of Ohio Standard Requirements for Public Facility Construction

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## Certifications

These Supplementary Instructions amend and supplement the Instructions to Bidders (Multiple-Prime or General Contracting) and other provisions of the Contract Documents as indicated below. All provisions not amended remain in full force and effect. The terms in these Supplementary Instructions defined in the Contracting Definitions or the Instructions to Bidders shall have the meanings assigned to them in those documents.

These Supplementary Instructions are authorized, by the Ohio Facilities Construction Commission, for use on projects constructed by and for Sinclair Community College.

## Contracting Authority and Owner

Sinclair Community College  
Purchasing Department  
444 West Third Street  
Dayton, Ohio 45402  
937.512.3020  
<http://www.sinclair.edu/about/offices/purchasing/>

## MODIFICATIONS TO INSTRUCTIONS TO BIDDERS

*Replace Sections 2.6.1.2 and 2.6.1.2.1 with the following:*

**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, 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.

*Replace Section 2.10.3.2 with the following:*

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

*Replace Section 2.10.3.4 with the following:*

**2.10.3.4** a complete listing of Affirmative Action violations in the last 5 years;

*Delete Section 2.10.3.11 in its entirety.*

*Insert Sections 2.10.3.17 and 2.10.3.18 as follows:*

**2.10.3.17** A current Disclosure of Personal Property Taxes form. This form can be found in the Available Forms link at <http://www.sinclair.edu/about/offices/purchasing/how-to-do-business-with-the-college/>.

**2.10.3.18** In addition to the items above, the Bidder shall demonstrate good faith efforts by providing the M/WBE Good Faith Effort Guidelines and Subcontracting Plan, Certified Statement of Intent to Contract and Perform, and Demonstration of Good Faith Effort. These forms are available at <http://www.sinclair.edu/www/assets/File/Hom-AboSin-ColOff-Off-Dep-Pur/GFE.pdf>.

*Replace Section 3.5.3.4 with the following:*

**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 efforts by providing requested Good Faith Effort documentation;

*Replace Sections 6.1.11 and 6.1.11.1 with the following:*

**6.1.11** Good Faith Efforts – Supporting Documentation Required.

**6.1.11.1** The Bidder shall provide evidence acceptable to the Contracting Authority of the Bidder's good faith efforts, by providing documentation which includes M/WBE Good Faith Effort Guidelines and Subcontracting Plan, Certified Statement of Intent to Contract and Perform, and Demonstration of Good Faith Effort.

*Replace Section 6.2.1.2 with the following:*

**6.2.1.2** The **Bidder's Qualifications** form not previously provided within 3 business days of receiving the Contracting Authority's request.

**END OF DOCUMENT**

# Document 00 41 13 - Bid Form (General Contract / Electronic Bid)

## State of Ohio Standard Requirements for Public Facility Construction

THIS SAMPLE BID FORM IS PROVIDED WITH THE PROJECT MANUAL AS A PLACEHOLDER ONLY – SUBMIT YOUR BID USING THE ELECTRONIC BID FORM ON [HTTPS://BIDEXPRESS.COM](https://bidexpress.com)

General Info	Alt Total:	Bid Total:
<p><b>Deadline</b> 02/13/2025 2:00 PM Local Time</p> <p><b>Advertised</b> January 20, 27, &amp; February 3, 2025</p> <p><b>Number</b> FAC 24-28X</p> <p><b>Business Name</b> Sinclair College</p>	<p><b>Description</b> Interior renovation of approximately 3,800 SF in the basement of Building 14. The existing building is Type II-B, Use Group B-Business &amp; A-3 Assembly (accessory use). Renovations include selective demolition of non-structural partitions, new partitions, new wall, ceiling and floor finishes, new lighting, coordination with the installation of an ambulance simulator. Plumbing systems, mechanical ductwork, diffusers and fire protection sprinklers will be reworked to accommodate the new floor plan and other Work indicated in the Contract Documents.</p>	

**Procurement Documents**

«insert Public Bid Advertisement file name»  
→ Public Bid Advertisement

«insert Solicitation file name»  
→ Notice to Bidders

«insert Project Manual file name»  
→ Procurement & Contracting Requirements and Specifications

«insert Drawings file name»  
→ Plans, elevations, sections, details, and schedules

«4» Attachments

**Contract Times and Addenda**

Contract Times

The time for Substantial Completion of all Work is 120 consecutive days from the Notice to Proceed.

Acknowledgement of receipt of Addenda

Date Addendum #1 Received	Date Addendum #2 Received	Date Addendum #3 Received	Date Addendum #4 Received
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Base Bid Instructions**

Enter the amount of the Base Bid for ALL LABOR AND MATERIALS to complete the scope of Work. Include the amount of each Allowance (if applicable) and the subtotal of each Unit Price Extension (if applicable) in the Base Bid amount. Failure to include Allowance or Unit Price Extensions in the Base Bid is the responsibility of the Bidder and will not be sufficient reason for adjustment of the Bid amount after the Bid deadline. Do not include Alternates (if applicable) in the Base Bid amount.

■ Base Bid (General Contract)			
Item	Description	Base Bid Amount*	Extension
Base Bid	All Labor and Materials (include Allowances and Unit Price Extensions above)	_____	
1 Item			<b>Total:</b>

■ Alternate Instructions

Enter the amount of each and every Alternate to ADD TO or DEDUCT FROM the Base Bid. Indicate amounts to DEDUCT FROM the Base Bid by entering a minus sign (-) before the amount entered. Do not include Alternate amounts in the Base Bid.

■ Alternates (General Contract)			
Item	Description	Alternate Amount*	Extension
! Alternate: Owner-agency may award independently from entire bid.			
! Alternates are not included in bid total.			
Alternate 1	Provide Doors @ E0024	_____	
Alternate 2	Renovate Open Office	_____	
2 Items		<b>Alternate Total:</b>	<b>Total:</b>

■ Bidder Affirmation and Disclosure

The Bidder acknowledges that by submitting its Bid, the Bidder 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:

<b>Contractor Address*</b>	<b>City, State, and Zip*</b>
<input type="text"/>	<input type="text"/>

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

<b>Subcontractor Name*</b>	<b>Address, City, State, and Zip*</b>
<input type="text"/>	<input type="text"/>

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

<b>Name*</b>	<b>Address, City, State, and Zip*</b>
<input type="text"/>	<input type="text"/>

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

<b>Subcontractor Name</b>	<b>Address, City, State, and Zip</b>
<input type="text"/>	<input type="text"/>

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

**Address\***

**City, State, and Zip\***

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

**Subcontractor Name**

**Address, City, State, and Zip**

Bidder also affirms, understands and agrees that the Contractor and its Subcontractors are under a duty to disclose to the State any change or shift in location of services performed by the Contractor 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 Contractor to perform the services outside the United States.

On behalf of the Bidder, I acknowledge that I am duly authorized to execute this electronic 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.

### EDGE Program Commitment to Participate

Option A

The 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 EDGE-certified Business(es).

The 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 Affidavit form for each EDGE-certified Business proposed for use by the Bidder if awarded the Contract for this Project.

Option B (indicate percentage of participation below)

The Bidder declares that it does not meet the advertised EDGE Participation Goal percentage, but, if awarded the Contract for this Project, commits to provide the percentage of the Contract award amount, indicated above, calculated as a portion of the Base Bid plus all accepted Alternates, by using EDGE-certified Business(es).

The 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.

The 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 Qualifications Form, including an EDGE Affidavit form for each EDGE-certified Business proposed for use by the Bidder if awarded the Contract for this Project.

Option C

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

Select EDGE option above\*

If option B selected, enter percentage

### ■ Certifications (State Prevailing Wages)

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 submitting a Bid 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 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.
8. 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.
9. 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.
10. The Bidder agrees to furnish any information requested by the Contracting Authority or the Architect/Engineer to evaluate the responsibility of the Bidder.
11. 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.
12. When the Bidder is a corporation, partnership or sole proprietorship, an officer, partner or principal of the Bidder, as applicable, shall enter the legal name of the Bidder and the name of the officer, partner or principal of the Bidder (in lieu of signing the Bid Form) in the data fields provided.
13. When the Bidder is a joint venture, an officer, partner or principal, as applicable, of each member of the joint venture shall enter the legal name of the applicable member and the name of the officer, partner or principal (in lieu of signing the Bid Form) in the data fields provided.
14. 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.
15. The Bidder represents that the individual that is submitting and digitally signing the electronic Bid is legally authorized to do so.
16. Bidder acknowledges that by the act of submitting an electronic Bid that it is digitally signing the actual Bid, which shall serve as the Bidder's authorization for the further consideration and activity in the bidding and contract process.

The Bidder hereby acknowledges that the above representations in this Bid are material and not mere recitals.\*

**■ Procurement Forms**

[Document 00 43 13 - Bid Security Form](#)  
→ Upload below and provide original document within 3 days

[Document 00 45 13 - Bidder's Qualifications](#)  
→ Upload below or provide within 3 days of request

[Document 00 45 39 - EDGE Affidavit](#)  
→ Upload below or provide within 3 days of request

3 Attachments

**■ Instructions for Providing Bid Submittals**

**Submission of Electronic Facsimile of Bid Guaranty with Electronic Bid**

The Bidder SHALL UPLOAD and ATTACH TO ITS BID an ELECTRONIC FACSIMILE (scanned PDF document) OF ITS BID GUARANTY, payable to the Contracting Authority, in the form of either: (1) the signed and sealed Document 00 43 13 - "Bid Security Form" contained in the Contract Documents (and provided for the Bidder's convenience in the block above) for the amount of the Base Bid plus all additive Alternates; or (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. Refer to Sections 2.10.1.1 and 5.1 of Document 00 21 13 - "Instructions to Bidders."

**Submission of Original Bid Guaranty**

In addition to the Electronic Facsimile above, the Bidder SHALL DELIVER ITS ORIGINAL UNALTERED BID GUARANTY to the Project Coordinator at the address identified below WITHIN 3 BUSINESS DAYS AFTER THE BID DEADLINE as provided in Ohio Administrative Code Section 153:1-8-01(H). THIS REQUIREMENT APPLIES TO ALL BIDDERS. Refer to Section 2.10.1.2 of the Instructions to Bidders.

Sinclair College  
Chris Harring  
Sinclair College  
444 West Third Street, 17115  
Dayton, Ohio 45402

**Non-responsive Bid for Failure to Submit Bid Guaranty**

Each Bidder MUST SUBMIT BOTH THE ELECTRONIC FACSIMILE AND THE ORIGINAL UNALTERED BID GUARANTY as described above. The Contracting Authority SHALL REJECT A BID AS NON-RESPONSIVE if the Bidder fails to submit BOTH elements of the Bid Guaranty. The checkboxes below are to identify that you have uploaded the other form of Bid Guaranty. DO NOT CHECK ALL BOXES. Refer to Section 2.10.1 of the Instructions to Bidders.

**Submission of Bidder's Qualifications and EDGE Affidavit**

The Bidder is encouraged to submit background information with its Bid using Document 00 45 13 - "Bidder's Qualifications" and Document 00 45 39 - "EDGE Affidavit" with the EDGE-certified Business(es) the Bidder proposes to use on the Project (forms provided for the Bidder's convenience in the block above). If the Bidder does not submit the Bidder's Qualifications form and/or the EDGE Affidavit form and related information attached to the electronic Bid Form, the Bidder shall provide it within 3 days of request. Refer to Sections 2.10.3 and 3.5.4 of the Instructions to Bidders.

**■ Required Bid Guaranty Upload**

Name	File*
Document 00 43 13 - Bid Security Form → Upload a scan of the fully executed Bid Security Form AND submit the original document to the Contracting Authority within 3 days of the bid deadline	<input type="button" value="Select file..."/> no file selected <input type="checkbox"/> I am NOT enclosing this document because the <a href="#">omission terms</a> have been met. (Bidder submitted a Cashier's check below)

<p>Power of Attorney</p> <p>→ Upload a scan of the fully executed Power of Attorney AND submit the original document to the Contracting Authority within 3 days of the bid deadline</p>	<p><a href="#">Select file...</a> no file selected</p> <p><input type="checkbox"/> I am NOT enclosing this document because the <a href="#">omission terms</a> have been met. (Bidder submitted a Cashier's check below OR included with the Bid Security Form above)</p>
<p>Cashier's Check for 10% of the Bid</p> <p>→ Upload a scan of the Cashier's Check AND submit the original check to the Contracting Authority within 3 days of the bid deadline</p>	<p><a href="#">Select file...</a> no file selected</p> <p><input type="checkbox"/> I am NOT enclosing this document because the <a href="#">omission terms</a> have been met. (Bidder submitted the Bid Security Form AND Power of Attorney above)</p>
<p>3 Required Documents</p>	

**■ Bidder Signatory Information**

Bidder Signatory

**Name of Bidder's Authorized Signatory:\***  **Title of Authorized Signatory:\***

**All Bidders complete all information in this form. Duplicate and complete the block below for each Joint Venturer:**

Bidder Information

**Business Name:\***

**Business Mailing Address, City, State, Zip:\***

**Telephone Number:\***  **Facsimile Number:**  **Email Address:\***

**Federal Tax ID Number:\***  **State of Incorporation (if applicable):**

**Contact person for Contract processing:\***  **Date enrolled in an OBWC-approved DFSP (month/date/year):**

**President or Chief Executive Officer's Name:\***  **President or Chief Executive Officer's Title:\***

**END OF DOCUMENT**



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

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( 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:**

**SURETY:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

By: \_\_\_\_\_  
Name

By: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
Title

**SURETY INFORMATION:**

**SURETY AGENT'S INFORMATION:**

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address 1

\_\_\_\_\_  
Address 1

\_\_\_\_\_  
Address 2

\_\_\_\_\_  
Address 2

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
City State Zip

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Email

\_\_\_\_\_  
Email

**END OF DOCUMENT**

# Document 00 45 13 - Bidder's Qualifications

## State of Ohio Standard Requirements for Public Facility Construction

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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.**



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**



**Document 00 45 39 - EDGE Affidavit**  
**State of Ohio Standard Requirements for Public Facility Construction**

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**EDGE PARTICIPATION**

**Certified Statement of Intent to Contract and Perform**

**Bidder or Proposer:** Submit one fully completed form for each EDGE-certified Business

**Project:** \_\_\_\_\_

**Project Name:** \_\_\_\_\_

**A. Bidder or Proposer's Company Name:** \_\_\_\_\_

Mark all that apply:

Multi-Prime Contract     General Contract     CM at Risk Contract     Design-Build Contract

**B. EDGE-certified Business information** (for contract at ANY tier)

Mark all that apply:

Subcontractor     Material Supplier     Professional Services     Goods & Services

EDGE Business Name: \_\_\_\_\_

EDGE Business Address: \_\_\_\_\_

EDGE Certification Number: \_\_\_\_\_ E-mail: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_

Insert detailed description of materials, labor, services, supplies, etc. (may use industry codes – continue on separate page):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**C. Certification of Intent**

By signing below, the Bidder or Proposer certifies that it intends to contract with the EDGE-certified Business for the portion of the contract described above related to its Contract for this Project and for the estimated cost shown below. By signing below, the EDGE-certified Business certifies that it intends to contract with the Bidder or Proposer and intends to provide the portion of the contract described above related to the Contract for this Project for the estimated cost of:

\_\_\_\_\_ and \_\_\_\_\_ /100 dollars ( \$ \_\_\_\_\_ ).

In the event the named Bidder or Proposer is NOT awarded a Contract, this Statement shall be null and void.

***EDGE-certified Business***

***Bidder or Proposer***

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
Date Signed

**END OF DOCUMENT**





# Document 00 52 00 - Agreement Form (College Project)

## State of Ohio Standard Requirements for Public Facility Construction

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This Agreement is made as of the date set forth below between the State of Ohio, acting by and through the College, and the Contractor in connection with the Project.

**Project Number:** FAC 24-28X  
**Project Name:** EMS Classrooms & Sim Lab Bldg. 14  
**Site Address:** Sinclair College  
444 West Third Street  
Dayton, OH 45402  
Montgomery County

**Owner (“College”):** Sinclair College  
**Owner’s Representative:** Chris Haring  
**Address:** Sinclair College  
444 West Third Street  
Dayton, OH 45402

**Contracting Authority:** The College above  
**Project Manager:** Chris Haring

**Contractor:** <insert name>  
**Contractor’s Principal Contact:** <insert name>  
**Address:** <insert street address>  
<insert city, state zip code>

**Architect/Engineer (“A/E”):** SPGB Architects, LLC  
**A/E’s Principal Contact:** Thomas Gates, AIA  
**Address:** 4333-A Tuller Road  
Dublin, OH, 43017

### ARTICLE 1 - SCOPE OF WORK

- 1.1 The Contractor shall perform and provide all of the Work described in the Contract.
- 1.2 The project delivery method for this Project shall be <insert project delivery method>.

### ARTICLE 2 - COMPENSATION

2.1 The College shall pay the Contractor the Contract Sum for the Contractor’s proper, timely, and complete performance of the Contract. The Contract Sum is \$<insert amount>, subject to Modifications as provided in the Contract Documents. The Contract Sum is comprised of the following:

- 2.1.1 Base Bid: .....\$<Insert Base Bid Amount>
- 2.1.2 Alternate <Insert Alternates Awarded>: .....\$<Insert Alternate Amount>
- 2.1.3 Alternate <Insert Alternates Awarded>: .....\$<Insert Alternate Amount>
- 2.1.4 Alternate <Insert Alternates Awarded>: .....\$<Insert Alternate Amount>
- 2.1.5 Alternate <Insert Alternates Awarded>: .....\$<Insert Alt2024-NOVernate Amount>

**ARTICLE 3 - CONTRACT TIMES**

3.1 The Contract Times are the periods established in the following table for the achievement of the associated Milestones:

Construction Stage Milestone(s) to which Liquidated Damages apply	Contract Time	Projected Date (as of the date of this Agreement)
Substantial Completion of all Work	120 days	<insert date>

*Each duration in the Contract Time column above must be calculated from the anticipated date of the Notice to Proceed for the Work covered by this Agreement to the date that the milestone must be achieved. DO NOT insert durations calculated between interim milestones as this DOES NOT comply with the General Conditions. Delete this box.*

3.1.1 The projected dates listed under “Projected Date (as of the date of this Agreement)” are provided only for convenient reference during consideration of the Agreement. The durations listed under “Contract Time” define the Contract Times and take precedence over the projected dates.

**ARTICLE 4 - KEY PERSONNEL**

4.1 The Contractor’s key personnel for the Project are:

- 4.1.1 <insert name>, Project Manager;
- 4.1.2 <insert name>, Lead Scheduling Engineer;
- 4.1.3 <insert name>, General Superintendent.

*Edit the above list as appropriate for the Project and then delete this box.*

4.2 The Contractor’s key personnel are authorized to act on the Contractor’s behalf with respect to the Project and all matters concerning the Project.

**ARTICLE 5 - GENERAL PROVISIONS**

5.1 Effectiveness.

5.1.1 It is expressly understood by the Contractor that none of the rights, duties, and obligations described in the Contract Documents shall be valid and enforceable unless the Director of the Office of Budget and Management first certifies that there is a balance in the College’s appropriation not already encumbered to pay existing obligations and until all relevant statutory provisions of the Ohio Revised Code, including ORC Section 126.07, have been complied with, and until such time as all necessary funds are available or encumbered and, when required, such expenditure of such funds is approved by the State Controlling Board, or other applicable approving body.

5.1.2 In addition, if federal funds are to be used to pay fees and expenses under this Agreement, none of the rights, duties, and obligations contained in this Agreement shall be binding on any party until the College gives the Contractor written notice that such funds are available from the College’s funding source.

5.1.3 Subject to **Section 5.1.1**, the Contract shall become binding and effective upon execution by the College, Contractor, and Ohio Attorney General.

5.1.3.1 If the Contractor is a joint venture, **(1)** each individual joint venturer shall **(a)** sign the Agreement in its own name and **(b)** be a party to the Contract, and **(2)** the Contract and the Performance and Payment Bond shall be binding on and apply to all joint venturers jointly and severally.

5.1.3.2 If the Contractor is a limited liability company, which the Contracting Authority reasonably believes to be a special purpose or similar entity, the Contracting Authority may in its discretion require the limited liability company and each member of the limited liability company to **(1)** sign the Agreement in its own name and **(2)** be a party to the Contract. In that case, the Contract and the Performance and Payment Bond shall be binding on and apply to the limited liability company and to all of its members jointly and severally.

5.1.4 This Agreement may be executed in several counterparts, each of which shall constitute a complete original Agreement, which may be introduced in evidence or used for any other purpose without production of any other counterparts.

5.2 Representations.

5.2.1 The Contractor represents and warrants that it is not subject to an unresolved finding for recovery under ORC Section 9.24. If this representation and warranty is found to be false, the Contract is void, and the Contractor shall immediately repay to the College any funds paid under this Contract.

5.2.2 The Contractor hereby certifies that neither the Contractor nor any of the Contractor’s partners, officers, directors, shareholders nor the spouses of any such person have made contributions in excess of the limitations specified in ORC Section 3517.13.

5.2.3 The Contractor, by signature on this Agreement, certifies that it is currently in compliance with, and will continue to adhere to, the requirements of Ohio ethics laws and conflict of interest laws and will take no action inconsistent with those laws.

5.2.4 The Contractor affirms to have read and understands Executive Order 2019-12D and shall abide by those requirements in the performance of this Contract. Notwithstanding any other terms of this Contract, the State reserves the right to recover any funds paid for services the Contractor performs outside of the United States for which it did not receive a waiver. The State does not waive any other rights and remedies provided the State in this Contract.

5.2.5 The Contractor affirms to have read and understands Executive Order 2022-02D regarding the prohibition of purchases from or investment in a Russian institution or company and shall abide by those requirements in the performance of this Contract. Notwithstanding any other terms of this Contract, the State reserves the right to recover any funds paid to the Contractor for purchases or investments in a Russian institution or company in violation of this paragraph. The provisions of this paragraph will expire when the applicable Executive Order is no longer effective.

5.2.6 During the performance of this Contract, if the Contractor changes the location(s) disclosed on the **Affirmation and Disclosure Form** (a page in its **Bid Form**), the Contractor must complete and submit a revised **Affirmation and Disclosure Form**.

5.2.7 Pursuant to ORC Section 9.76(B), the Contractor warrants that it is not boycotting any jurisdiction with whom the State of Ohio can enjoy open trade, including Israel, and will not do so during the term of this Contract.

**ARTICLE 6 - Enumeration of Documents**

6.1 The Contract Documents constitute the substance of the Contract, and include this Agreement, Drawings, Specifications, Addenda if any, **Contracting Definitions, General Conditions**, Supplementary Conditions if any, **Bid Form, Wage Rate Requirements, Bid Guaranty and Contract Bond or Performance and Payment Bond**, and Change Orders if any.

**TREASURER’S CERTIFICATION**

This signature certifies the amount required to meet the obligation in the fiscal year in which this Agreement is made has been lawfully appropriated for such purpose and is in the treasury or in process of collection to the credit of an appropriate fund free from any previous encumbrances.

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*

Chief Financial Officer

**SIGNATURES**

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date set forth below:

«INSERT CONTRACTOR’S NAME»

**OWNER**

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Title*

**OHIO ATTORNEY GENERAL**  
Approval as to Form

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Date*

*If the Contractor is a corporation, partnership, sole proprietorship, or limited liability company, use the table above. If the Contractor is a joint venture or special purpose entity, use the table below. Then delete the unused table and this note.*

«INSERT CONTRACTOR’S NAME»

**OWNER**

by «insert Joint Venturer/Member’s name»

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Title*

by «insert Joint Venturer/Member’s name»

**OHIO ATTORNEY GENERAL**  
Approval as to Form

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*

\_\_\_\_\_  
*Printed Name*

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*Title*

---

*Title*

---

*Date*

**END OF DOCUMENT**



**Document 00 61 13.19 - Acknowledgement of Surety (General Contracting)**  
**State of Ohio Standard Requirements for Public Facility Construction**

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**Project Number:** \_\_\_\_\_  
**Project Name:** \_\_\_\_\_  
**Owner:** \_\_\_\_\_  
**Contracting Authority:** \_\_\_\_\_  
**Contractor:** \_\_\_\_\_  
**Surety Name:** \_\_\_\_\_  
**Performance & Payment Bond No.:** \_\_\_\_\_  
**Original Penal Sum:** \_\_\_\_\_

As required under the Contract between the State of Ohio, acting by and through the Contracting Authority, and the Contractor in connection with the Project, the Surety hereby acknowledges that the Penal Sum of the above-mentioned Bond has been increased to \$\_\_\_\_\_ (*must be not less than 100% of the Contract Sum*).

**SURETY:**

**SURETY INFORMATION:**

\_\_\_\_\_  
Surety Signature  
  
By: \_\_\_\_\_  
Attorney-in-Fact  
  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Street  
  
\_\_\_\_\_  
City State Zip  
  
\_\_\_\_\_  
Telephone Number

**SURETY AGENT'S INFORMATION:**

\_\_\_\_\_  
Agency Name  
  
\_\_\_\_\_  
Street  
  
\_\_\_\_\_  
City State Zip  
  
\_\_\_\_\_  
Telephone Number

**END OF DOCUMENT**





# Document 00 71 00 - Contracting Definitions (General Contracting Project)

## State of Ohio Standard Requirements for Public Facility Construction

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<b>Acceptable Component</b>	A component listed in the Specifications after the Basis of Design Component.
<b>Addenda or Addendum</b>	Written or graphic instrument issued prior to the bid opening which modifies or interprets the proposed Contract Documents by additions, deletions, clarifications, or corrections. Addenda become part of the Contract Documents when the Agreement is executed.
<b>ADR</b>	See “Alternative Dispute Resolution.”
<b>A/E</b>	See “Architect/Engineer.”
<b>Agreement</b>	The form furnished by the Contracting Authority (including all of its exhibits) that, when completed and signed by the Contractor and Contracting Authority evidences entry into the Contract.
<b>Allowance</b>	A sum stipulated in the Contract Documents for a defined scope of the Work that may not be completely defined at the time of bidding. Allowance amounts do not include the Contractor’s Fee on account of the associated Work.
<b>Alternate</b>	A change in the proposed Project scope, which may include but is not limited to alternate materials or methods of construction, and an amount stated on the Bid form to be added to or deducted from the Base Bid if the corresponding Alternate is incorporated into the Contract.
<b>Alternative Dispute Resolution</b>	A voluntary and non-binding process for the administrative review, consideration, and attempted settlement of a dispute, without resort to judicial process, including but not limited to partnering, negotiation, mediation, impartial fact-finding, dispute review board, and mini-trials, but shall not include arbitration.
<b>Applicable Law</b>	All federal, state, and local codes, statutes, ordinances, and regulations that apply to the performance of the Work or the A/E’s Services on the Project.
<b>Architect/Engineer</b>	The Person responsible for providing professional design services and construction contract administration for the Project as provided in the Contract Documents. The A/E shall be a <b>(1)</b> registered architect holding a license and certificate of authorization issued by the Ohio Architects Board pursuant to ORC Chapter 4703, <b>(2)</b> landscape architect holding a license and certificate of authorization issued by the Ohio Landscape Architects Board pursuant to ORC Chapter 4703, or <b>(3)</b> professional engineer or professional surveyor holding a license and certificate of authorization issued by the Ohio Engineers and Surveyors Board pursuant to ORC Chapter 4733.
<b>As-Built Documents</b>	Documents, including but not limited to Drawings, Addenda, Specifications, Modifications, and other elements of the Contract Documents which the Contractor annotates and otherwise modifies to indicate changes made during the construction process, the location of concealed and buried items, and other information useful to the Owner throughout the life of the completed Project.
<b>Base Bid</b>	The amount stated in a Bid as the sum for which the Bidder offers to perform the Work in a particular trade or other category, which is described in the Contract Documents, excluding Alternates.
<b>Basis of Design</b>	A document that records the concepts, calculations, decisions, and product selections used to meet the Owner’s Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
<b>Basis of Design Component</b>	A component listed first in the Specifications.

<b>Bid</b>	A written proposal to perform a Contract, submitted on a completed Bid Form, accompanied by other required documents. The term Bid includes a proposal that has been digitally signed, encrypted, and submitted through the State's electronic bidding application pursuant to OAC Section 153:1-8-01.
<b>Bidder</b>	A Person that submitted a Bid.
<b>BIM</b>	See "Building Information Model."
<b>Bid Form</b>	A form furnished by the Contracting Authority with the proposed Contract Documents that is to be completed, signed, and submitted containing the Bidder's Bid.
<b>Bid Guaranty</b>	A bid bond or other instrument of security authorized by ORC Section 153.54 submitted with the Bid to provide assurance that the Bidder will execute the Agreement.
<b>Bond</b>	A performance and payment bond in the format specified by ORC Section 153.57 submitted by the Contractor to provide assurance that the Contractor will perform the Work of the Contract, including making required payments to Subcontractors and Materials Suppliers.
<b>Building Information Model</b>	A digital representation of physical and functional characteristics of a facility; a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle, which is defined as existing from earliest conception to demolition; electronic files used to design and coordinate the Project; and may be used to describe a single model or multiple models used in the aggregate.
<b>Certificate of Contract Completion</b>	A form used to document that the Contractor's achievement of Contract Completion. This form may also be used to document partial Contract Completion.
<b>Certificate of Substantial Completion</b>	A form used to document <b>(1)</b> that the Contractor has achieved Substantial Completion of the Work or a designated portion of the Work for which the Contracting Authority and the Owner have agreed to take Partial Occupancy, and <b>(2)</b> the date on which the associated Substantial Completion of the Work was achieved.
<b>Change Directive</b>	A written document prepared by the A/E and executed by the Contracting Authority that directs a change in the Work.
<b>Change Order</b>	A document recommended by the A/E and executed by the Contracting Authority and the Contractor that modifies the Contract.
<b>Claim</b>	A demand or assertion, initiated by written notice, certified by one of the parties to the Contract seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract.
<b>Commission</b>	See "Ohio Facilities Construction Commission."
<b>Commissioning Agent</b>	The Person identified by the Contracting Authority who leads, plans, schedules, and coordinates the commissioning team to implement the Commissioning Process for the Project.
<b>Commissioning Plan</b>	A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
<b>Commissioning Process</b>	A quality-focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that the facility and all of its systems are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

<b>Commissioning Report</b>	A document that records the activities and results of the Commissioning Process. The Commissioning Report is developed from the final Commissioning Plan with its attached appendices.
<b>Conformed Documents</b>	Contract Documents with all Addenda items and accepted Alternates incorporated by the A/E, published, and issued to a successful Bidder for its use during performance of the Contract. The Conformed Documents are furnished solely for the Contractor's convenience. In the event of any conflict between the Contract Documents modified by Addenda and the Conformed Documents, the Contract Documents take precedence.
<b>Construction Budget</b>	The amount identified in the Agreement as adjusted by the Owner and Contracting Authority.
<b>Construction Cost</b>	The sum of the Contract Cost amounts for a phase of the Project.
<b>Construction Progress Schedule</b>	The critical path schedule for performance of the Contract; showing the time for completing the Work within the Contract Times; the planned sequence for performing the various components of the Work; the interrelationship between the activities of the Contractor, A/E, Contracting Authority, and Owner; and the Contractor's resource and cost loading information; as periodically updated during the performance of the Work.
<b>Contract</b>	The state of legal obligation entered into by the State and the Contractor, whereby they have agreed to an exchange of certain acts, materials, equipment, and services for certain monetary consideration, under all terms and conditions specified in the Contract Documents, which shall remain in full force and effect until such time as all obligations under the Contract have been lawfully and completely discharged, or the Contract is terminated under other conditions specified in the Contract Documents.
<b>Contract Completion</b>	The schedule Milestone in the progress of any Phase when the Work is completed in accordance with the terms of the Contract Documents and Contractor has satisfied all of its other obligations under the Contract Documents, including but not limited to <b>(1)</b> all governmental authorities have given final, written approval of the Work, <b>(2)</b> a final unconditional certificate of occupancy has been granted and issued to the Owner by the appropriate governmental authorities, <b>(3)</b> the Contractor's Work is 100 percent complete, and <b>(4)</b> all Punch List items have been completed or corrected, and <b>(5)</b> the Contractor has complied with conditions precedent to final payment and release of retained funds.
<b>Contract Documents</b>	Collectively, the documents that constitute the substance of the Contract including Drawings, Specifications, Addenda if any, General Conditions, Supplementary Conditions if any, Bid Form, Wage Rates; and the executed Agreement, Bid Guaranty and Contract Bond, and Modifications if any.
<b>Contract Sum</b>	The Contract Sum is the Contractor's entire compensation for the Contractor's proper, timely, and complete performance of the Work and is subject to adjustment as provided in the Contract.
<b>Contract Times</b>	The periods stipulated in the Agreement for the achievement of associated Milestones, in consecutive days, beginning on the date established by the Notice to Proceed, including adjustments authorized by executed Change Orders.
<b>Contracting Authority</b>	The party identified as such in the Agreement, which may be the Ohio Facilities Construction Commission; an agency of the state of Ohio; an Institution of Higher Education or division thereof; a School District Board; or the legislative body of a political subdivision.
<b>Contractor</b>	A firm, which is party to the Contract for the performance of Work on the Project in accordance with the Contract Documents.
<b>Contractor's Documents</b>	All Project-related documents, including those in electronic form, prepared by the Contractor and its Subcontractors.

<b>Contractor's Fee</b>	The portion of the Contract Sum attributable to the aggregate of the Contractor's profit and home-office overhead related to the Contractor's proper, timely, and complete performance of the Work.
<b>Contractor Payment Request</b>	The form furnished by the Commission that is to be used by the Contractor in requesting payments and which, when signed by the Contractor, shall serve as an affidavit that payments requested are in proportion to the Work completed as shown on the Schedule of Values.
<b>Contractor's Punch List</b>	A document prepared by the Contractor that consists of a list of items of Work to be completed or corrected by the Contractor as a condition precedent to Contract Completion.
<b>Coordination Drawings</b>	Drawings and Electronic Files prepared by the Contractor to demonstrate how multiple-system and interdisciplinary work will be coordinated. Clash reports generated by BIM authoring software may be included in the Coordination Drawing submittals if applicable.
<b>Correction Period</b>	A period of one year commencing 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.
<b>CxA</b>	See "Commissioning Agent."
<b>Date of Commencement</b>	The date established in a Notice to Proceed issued by the Contracting Authority to the Contractor to mark the start of the Work and the beginning of the running of the Contract Times.
<b>day</b>	A calendar day of 24 hours measured from midnight to midnight, unless otherwise expressly specified to mean a business day.
<b>Defective Work</b>	Work that does not conform to the Contract Documents; or does not meet the requirements of any applicable statute, rule or regulation, inspection, reference standard, test or approval; or has been damaged prior to the A/E's recommendation of final payment, unless responsibility for the protection thereof has been expressly assumed by the Owner; or that is not free from defects in workmanship, materials, or equipment during the period of any warranty or guarantee.
<b>Differing Site Condition</b>	Either <b>(1)</b> a subsurface or otherwise concealed physical condition encountered at the Site that differs materially from the conditions indicated in the Contract Documents or <b>(2)</b> an unknown physical condition of an unusual nature encountered at the Site that differs materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents.
<b>Dispute Review Board</b>	A form of Alternative Dispute Resolution that is typically comprised of three members, selected jointly by the Contractor and the Contracting Authority, to monitor the progress of construction and provide recommended resolutions to disputes that are brought before them.
<b>Drawings</b>	Graphic portions of the Contract Documents, showing the design, type of construction, location, dimension, and character of the Work to be provided by the Contractor, which generally includes plans, elevations, sections, details, schedules, diagrams, notes, and text.
<b>Electronic File</b>	Information maintained in a computer system or format that is intended to facilitate a Person's use and manipulation of the information including but not limited to Word, Excel, PDF, Primavera, CAD, and BIM files all in their native format.
<b>Enclosure, Permanent</b>	The condition in which the permanent exterior walls and roofs are in place, insulated and weathertight, and permanent windows and entrances are in place.
<b>Enclosure, Temporary</b>	The condition in which the permanent exterior walls and roofs are in place, insulated and weathertight, and windows and entrances are provided with suitable temporary enclosures.

<b>Estimated Construction Cost</b>	The sum of the Estimated Contract Cost amounts published in the Solicitation, as modified by Addenda, for a phase of the Project.
<b>Estimated Contract Cost</b>	The estimated amount for the Contract published in the Solicitation, including the Base Bid estimate and the estimates of selected Alternates, if any, as modified by Addenda.
<b>Extra Materials</b>	Materials required by the Contract Documents that are not incorporated into the Project but are given to the Owner to be used for future maintenance or repairs.
<b>Fee</b>	See "Contractor's Fee."
<b>Final Inspection</b>	The final review of the Work of the Contractor by the A/E to determine whether issuance of the Certificate of Contract Completion is appropriate.
<b>furnish</b>	Supply and deliver to the Site, or other specified location, ready for installation.
<b>General Conditions</b>	The State's Standard General Conditions in effect as of the date of the Agreement.
<b>General Conditions Costs</b>	General Conditions Costs include only the Contractor's costs to provide the general conditions Work including without limitation the costs of all of the following Site-related items: scheduling and coordinating 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, and pre-approved travel, lodging, and parking costs. General Conditions Costs also include <b>(1)</b> Bond premiums and <b>(2)</b> premiums for builder's risk insurance if the Contractor purchases the builder's risk policy for the Project.
<b>Hazardous Materials</b>	Any material, substance, pollutant, or contaminant that is defined, regulated, referenced, or classified in the Comprehensive Environmental Response, Compensation and Liability Act, Federal Water Pollution Control Act, the Resource Conservation and Recovery Act, Clean Air Act, Hazardous Materials Transportation Uniform Safety Act, Toxic Substances Control Act, or any other Applicable Law relating to any hazardous, toxic, or dangerous waste, substance, or material. Any substance or material that, after release into the environment or upon exposure, ingestion, inhalation, or assimilation, either directly from the environment or directly by ingestion through food chains, will, or may reasonably be anticipated to, cause death, disease, behavior abnormalities, cancer or genetic abnormalities and specifically includes but is not limited to asbestos, polychlorinated biphenyls ("PCBs"), radioactive materials, including radon and naturally occurring radio nuclides, natural gas, natural gas liquids, liquefied natural gas, synthetic gas, oil, petroleum and petroleum-based derivatives and urea formaldehyde.
<b>Indemnified Parties</b>	The State, Contracting Authority, Owner, A/E, other Separate Consultants, and their respective officials, officers, consultants, agents, representatives, and employees, in both individual and official capacities.
<b>install</b>	Put into use or place in final position, complete and ready for intended service or use.
<b>Institutional Designee</b>	The party identified in the Agreement empowered with a level of authority similar to the Executive Director of the Commission, which may be the university architect or engineer, director of capital facilities, or an institution vice president.
<b>Institution of Higher Education</b>	Any state of Ohio university or college, community college, state of Ohio community college, technical college, university branch, community college district, technical college district, university branch district, and the applicable board of trustees or, in the case of a university branch district, any other managing authority.
<b>Liquidated Damages</b>	A sum established in the Contract Documents, pursuant to the statutory delay forfeiture authorized under ORC Section 153.19, to be paid to the Owner due to the Contractor's failure to complete the Work within the Contract Time for achievement of Substantial Completion, or any applicable portion of the Work on or prior to any Milestone date stated on the Agreement.

<b>Material Supplier</b>	A Person under a contract with the Contractor to furnish materials or supplies in furtherance of the Work, including all such Persons in any tier. Material Supplier does not include any Separate Contractor unless expressly assigned in writing to the Contractor by the Owner and accepted by the Contractor.
<b>mediation</b>	A voluntary process in which a neutral third party meets with the parties who have a disagreement or dispute and attempts to facilitate a mutually satisfactory resolution.
<b>Milestone</b>	A principal event specified in the Contract relating to a completion date or time.
<b>Modification</b>	A <b>(1)</b> written amendment to the Contract signed by both parties, <b>(2)</b> Change Order, <b>(3)</b> Change Directive, or <b>(4)</b> an order for a minor change in the Work.
<b>negotiation</b>	A form of Alternative Dispute Resolution in which all parties involved are represented by those invested with the authority to agree to a determination of an adjustment in the Contract Sum, Contract Times, or both.
<b>Neutral Facilitator</b>	A nonpartisan third-party without decision-making authority who is engaged to assist the Project's key stakeholders in developing cooperative relationships, achieving project objectives, avoiding or minimizing disputes, and nurturing a more-collaborative ethic characterized by trust, cooperation, and teamwork.
<b>Notice of Commencement</b>	A notice prepared by the Contracting Authority identifying the Project, the Contractors, the Surety for each Contractor, and the name of the Contracting Authority's representative upon whom a claim affidavit may be served.
<b>Notice of Intent to Award</b>	A written notice provided by the Contracting Authority to the apparent successful Bidder stating that upon satisfactory compliance with all conditions precedent for execution of a Contract within the time specified, the Contracting Authority intends to execute a Contract with the Bidder.
<b>Notice to Proceed</b>	A written notice provided by the Contracting Authority authorizing the Contractor to proceed with the Work and establishing the dates for commencement and completion of the Work.
<b>OAC</b>	Ohio Administrative Code
<b>Ohio Facilities Construction Commission</b>	The authorized contracting agent for public improvement projects in accordance with ORC Chapters 123 and 153, acting by and through its Executive Director.
<b>ORC</b>	Ohio Revised Code
<b>Owner</b>	The state of Ohio agency, Institution of Higher Education or division thereof, School District Board, or other instrumentality for whom the Project is being constructed.
<b>Owner's Project Requirements</b>	A written document that details the functional requirements of the Project and the expectations of how it will be used and operated. These requirements include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
<b>Partial Occupancy</b>	The condition that occurs when the Owner occupies or uses a portion of the Project prior to Contract Completion, partial occupancy is approved by authorities with jurisdiction over the Project and the insurer(s) providing the builders risk insurance, and items of Work cannot be completed until a subsequent date.
<b>partnering</b>	A voluntary dispute prevention process involving team building activities to help define common goals, improve communication, and foster a problem-solving attitude among a group of contracting parties that must work together throughout Contract performance to be less adversarial and more cooperative.
<b>Payment Request</b>	See "Contractor Payment Request."
<b>Person</b>	An individual, corporation, business trust, estate, partnership, association, or other public or private entity.

<b>Phase</b>	A separation in the Work of the Project by sequence or time intervals, which may include separate contractors for each Phase.
<b>Plan Holder</b>	A prospective Bidder that received a set of Contract Documents prior to the bid opening.
<b>Product Data</b>	Manufacturer's standard illustrations, schedules, diagrams, performance charts, instructions, and brochures that illustrate physical appearance, size, and other characteristics of materials and equipment.
<b>Project</b>	The public improvement, of which the Work performed under the Contract Documents may be the whole or a part.
<b>Project Manager</b>	A permanent employee of the Contracting Authority assigned to the Project and authorized to perform specific responsibilities.
<b>Project Manual</b>	That part of Construction Documents which consists of bound volume(s) of primarily written material which generally contain Division 00 - "Procurement and Contracting Requirements," and Divisions 01 through 49 - "Specifications," and other documents pertaining to the Project.
<b>Proposal</b>	The offer of a Contractor to perform the Work set forth in a Proposal Request.
<b>Proposal Request</b>	A document issued after execution of the Contract requesting a Proposal from the Contractor(s), which may initiate a Change Order to modify the Contract.
<b>provide</b>	Furnish and install, complete and ready for intended use.
<b>Punch List</b>	A document listing items of Work requiring correction or completion by the Contractor as a condition precedent to Contract Completion.
<b>Punch List Milestone</b>	The date 30 days after the achievement of Substantial Completion of all or a portion of the Work.
<b>Record Documents</b>	Electronic files and printed documents of all nature prepared by the A/E, which incorporate the information shown on the Contractor's As-Built Documents. They consist of the "Record Drawings" and "Record Project Manual," Certificate of Substantial Completion, Certificate of Contract Completion (as complete), Contractor's Warranty, Manufacturers' Warrantees, certificate(s) of occupancy, approved shop drawings and other action submittals, responses to Requests for Information, Addenda, Modifications, Balancing Reports, and the final version of the approved Construction Progress Schedule.
<b>Record Drawings</b>	The Drawings, which have been revised by the A/E to show the changes made during the construction process, conformed to represent the Work as executed by the Contractor.
<b>Record Model</b>	The Building Information Model, which has been revised by the A/E to show the changes made during the construction process, conformed to represent the Work as executed by the Contractor.
<b>Record Project Manual</b>	The Project Manual of the Contract Documents, which has been revised by the A/E to show the changes made during the construction process, based on the As-Built Project Manual furnished by the Contractor.
<b>Request for Change Order</b>	A written notice from the Contractor accompanied by a Proposal for a change in the Work.
<b>Request for Information</b>	A written request to the A/E seeking an interpretation or clarification of the Contract Documents.
<b>RFI</b>	See "Request for Information."
<b>Samples</b>	Physical examples, color selection items, field samples, and mock-ups furnished by the Contractor to illustrate functional and aesthetic characteristics of products, materials, equipment, or workmanship and establish criteria by which the Work shall be judged.

<b>Schedule of Values</b>	A full, accurate, and detailed statement furnished by the Contractor reflecting a defined breakdown of the Contract Sum.
<b>School District</b>	A local, exempted village, or city school district as defined in ORC Chapter 3311, or a joint vocational school established pursuant to ORC Section 3311.18, performing essential governmental functions of state government pursuant to ORC Sections 3318.01 to 3318.20.
<b>School District Board</b>	The board of education of a School District.
<b>Separate Consultant</b>	A Person engaged by the Owner or Contracting Authority to provide Project-related professional services other than the services under this Contract. The term includes the Separate Consultant's authorized representatives, successors, assigns, and subconsultants regardless of tier.
<b>Separate Contract</b>	The contract between the Owner or Contracting Authority and a Separate Consultant or a Separate Contractor.
<b>Separate Contractor</b>	A Person under contract with the Owner or Contracting Authority to provide Project-related work other than the Work under this Contract. The term includes the Separate Contractor's authorized representatives, successors, assigns, and subcontractors regardless of tier.
<b>Shop Drawings</b>	Drawings, diagrams, illustrations, and schedules specifically prepared for the Project provided by the Contractor or a Subcontractor to illustrate some portion of the Work. Shop Drawings are not Contract Documents. Shop Drawings on equipment shall include a written statement from the manufacturer of the equipment certifying the equipment is in compliance with the Contract Documents.
<b>Site</b>	The location designated for the Project.
<b>Specifications</b>	Those portions of the Contract Documents consisting of detailed written administrative, procedural, and technical requirements, included in Divisions 01 through 49, for the construction of the Work, whether physically on the Drawings or bound in separate volumes, including identification of acceptable materials, methods, equipment, quality, and workmanship.
<b>Stage</b>	A distinct period in the life cycle of a facility from concept through construction, to use and deconstruction or demolition. Typical Stages include Program Verification, Schematic Design, Design Development, Construction Documents, Bidding and Award stages; and the Construction Stage, which includes Construction and Closeout activities.
<b>Standard Requirements</b>	The brief name of the "State of Ohio Standard Requirements for Public Facility Construction," including but not limited to General Conditions, and other Division 00 Documents and Division 01 Sections; in effect as of date of the Agreement.
<b>State</b>	The government of Ohio, including any organized body, office, or agency established by the laws of this state for the exercise of any function of state government, or any state institution of higher education as defined in ORC Section 3345.011.
<b>Subcontract</b>	Any contract or agreement between the Contractor and a Subcontractor for performance of a portion of the Work.
<b>Subcontract Form</b>	The <b>State of Ohio Subcontract Form</b> prescribed by OAC Section 153:1-3-02 and required for use with the General Contracting method of project delivery.
<b>Subcontractor</b>	A Person who undertakes to perform any part of the Work on the Project under a contract with a Contractor or with any Person other than the State, including all such Persons in any tier. The term "Subcontractor" includes Material Suppliers, but does not include any Separate Contractor unless expressly assigned in writing to the Contractor by the Owner and accepted by the Contractor.



<b>Substantial Completion</b>	The stage in the progress of the Work when the Work (or designated portion of the Work for which the Contracting Authority and Owner have agreed to take Partial Occupancy) is sufficiently complete in accordance with the Contract that the Owner can utilize the Work for its intended use, as determined by the A/E. The issuance of a certificate of occupancy or partial certificate of occupancy (if applicable) is a condition precedent to the achievement of Substantial Completion.
<b>Substantially Complete</b>	See "Substantial Completion."
<b>Substitution</b>	An article, device, material, equipment, form of construction, or other item, proposed by a prospective Bidder prior to the bid opening and approved by the A/E by Addendum, for incorporation or use in the Work as being functionally and qualitatively equivalent to essential attributes of a Basis of Design or Acceptable Component specified in the proposed Contract Documents.
<b>Supplementary Conditions</b>	Amendments to the General Conditions, issued as a separate document, which describe conditions of the Contract unique to a particular Owner or Project, which may include provisions regarding the assignment of responsibility for refuse removal, safety and security precautions and programs, temporary Project facilities and utilities, weather and fire protection, scaffolding and equipment, materials and services to be used commonly by the Contractor and Subcontractors and requiring the Contractor to provide assistance in the utilization of any applicable equipment system, preparation of operation and maintenance manuals, and training of Owner personnel for operation and maintenance of the Project. The General Conditions 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 Commission.
<b>Supplementary Instructions</b>	Amendments to the Instructions to Bidders, issued as a separate document, which describe instructions unique to a particular Owner or Project. The Instructions to Bidders shall not be superseded or amended by Drawings and Specifications, unless so provided in Supplementary Instructions prepared by the Contracting Authority and approved by the Commission.
<b>Surety</b>	A Person providing a Bid Guaranty or a Bond to a Bidder or a Contractor, as applicable, to indemnify the State against all direct and consequential damages suffered by failure of the Bidder to execute the Contract, or of the Contractor to perform the Contract and to pay all lawful claims of Subcontractors, Material Suppliers and laborers, as applicable.
<b>Systems Manual</b>	A system focused composite document that includes the operation manual, maintenance manual, and additional information of use to the Owner after they begin using the facility.
<b>Unit Price</b>	The cost of providing a unit of Work including labor, materials, services, and associated expenses. Unit Prices do not include the Contractor's Fee on account of the associated Unit Price Work.
<b>Work</b>	The labor, materials, equipment, and services, individually or collectively which are required by the Contract Documents, to be performed or provided by the Contractor for the Project. The furnishing of all material, labor, detailing, layout, supplies, plants, tools, scaffolding, transportation, temporary construction, superintendence, demolition, and all other services, facilities and items reasonably necessary for the full and proper performance and completion of the requirements of the Project as set forth in the Contract Documents, and items reasonably inferable therefrom and consistent therewith for the proper execution and completion of the construction and other services required by the Contract Documents, whether provided or to be provided by the Contractor or a Subcontractor, or any other entity for whom the Contractor is responsible, and whether or not performed or located on or off of the Site.

**END OF DOCUMENT**



**Document 00 72 13 - General Conditions (General Contracting Project)**  
**State of Ohio Standard Requirements for Public Facility Construction**

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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 126<sup>th</sup> 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: <http://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-permittee” 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 through 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.

#### **6.27.2 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 Directive 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 be 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

Contract Sum	Each Claim	Annual Aggregate
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 through 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 through 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**





# Document 00 73 00 - Supplementary Conditions (General Contracting) State of Ohio Standard Requirements for Public Facility Construction

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## Certifications

These Supplementary Conditions amend and supplement the General Conditions (General Contracting) and other provisions of the Contract Documents as indicated below. All provisions not amended remain in full force and effect. The terms in these Supplementary Conditions defined in the Contracting Definitions or the General Conditions shall have the meanings assigned to them in those documents.

These Supplementary Conditions are authorized, by the Ohio Facilities Construction Commission, for use on projects constructed by and for Sinclair Community College.

## Contracting Authority and Owner

Sinclair Community College  
Purchasing Department  
444 West Third Street  
Dayton, Ohio 45402  
937.512.3020  
<http://www.sinclair.edu/about/offices/purchasing/>

## Institutional Designee

Mark Schmid  
Manager of Purchasing and Materials Management

## MODIFICATIONS TO GENERAL CONDITIONS

*Replace Section 1.8 and subordinate sections with the following:*

### 1.8 Equal Opportunity Supplier Diversity Program

**1.8.1** The Contractor shall demonstrate its good faith efforts to comply with the Owner's Equal Opportunity Supplier Diversity Program ("EOSDP") by submitting the following forms: (1) the M/WBE Good Faith Effort Guidelines and Subcontracting Plan, (2) the Certified Statement of Intent to Contract and Perform, and (3) the Demonstration of Good Faith Effort. These forms are available at <http://www.sinclair.edu/www/assets/File/Hom-AboSin-ColOff-Off-Dep-Pur/GFE.pdf>.

*Insert Section 1.10.1.1 as follows:*

**1.10.1.1** If the emergency presents a threat of imminent harm or danger to people, property, or the environment, the Contractor shall immediately report the emergency to the Owner's Campus Police Dispatch.

*Replace Section 6.6.1 with the following:*

**6.6.1** The A/E shall schedule weekly or bi-weekly progress meetings 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.

*Replace Section 6.6.1.1 with the following:*

**6.6.1.1** The A/E shall be responsible for agenda, attendance sign-in sheet, and meeting minutes.

**6.6.1.2** The A/E shall distribute meeting minutes electronically to the Contractor and other Persons involved in the Project within 24 hours after the meeting.

*Insert Section 6.10.1.5 as follows:*

**6.10.1.5** The Contractor shall not bring any gas-powered equipment into the interior of any building or onto any roof.

*Insert Section 6.10.6 and associated subsections as follows:*

### **6.10.6** Barriers and Signs.

**6.10.6.1** If barriers and signs are required for the Work, the Contractor shall ensure that such barriers or signs are highly visible and maintained at all times.

**6.10.6.2** The Contractor shall provide and maintain all barricades and dust partitions as necessary to protect the Owner's employees and visitors prior to the start of the Work. Such barricades shall be constructed and located in strict accordance with Applicable Law.

*Insert Section 6.12.4 as follows:*

**6.12.4** All Work shall be performed by qualified, licensed, and skilled workers as required by Applicable Law.

*Insert Section 6.13.4.1.1 as follows:*

- .1** The Contractor shall obtain burn permits for all welding and soldering, or as otherwise required by Applicable Law.

*Insert Section 6.13.5.1.1 as follows:*

- .1** If a Hazardous Material presents a threat of imminent harm or danger to people, property, or the environment, the Contractor shall immediately report the condition to the Owner's Campus Police Dispatch.

*Insert Sections 6.15.1.1 through 6.15.1.5 as follows:*

**6.15.1.1** The Contractor shall keep the area of its Work in a clean, neat, and orderly condition on a daily basis.

**6.15.1.2** The Contractor shall immediately clean any debris from corridors, offices, or classrooms.

**6.15.1.3** All existing materials required to be moved by the Contractor, shall be moved in a manner to ensure the safety and protection of the existing structure, grounds, employees, students, and visitors.

**6.15.1.4** The Contractor shall not use the Owner's dumpsters, trashcans, or gondolas.

**6.15.1.5** The Contractor shall not store any items, including, but not limited to equipment and materials, in stairwells.

*Insert Sections 6.16.5.2 through 6.16.5.22 as follows:*

**6.16.5.2** Construction trailers shall not be permitted at the Site without the Owner's prior written permission.

**6.16.5.3** All material storage, employee parking, and access to the Site shall be limited to the area of the Site, unless otherwise approved by the Owner.

**6.16.5.4** When campus is closed (including 3rd shift Work), access to campus shall be through Building 7 for Buildings 1-8 and 10-12; through the intercom for Building 13; and by calling for access to Buildings 9, 14, and 20.

**6.16.5.5** When campus is closed, the Work may still proceed if coordinated in advance with the Owner. Whenever performing Work on campus, the Contractor shall check in and out at the Owner's Campus Police Dispatch Desk in Building 7.

**6.16.5.6** The Contractor shall verify with the Owner the location of, and area available for the storage of material and tools, and the placement of the construction office and temporary storage.

**6.16.5.7** The Contractor shall store products and material immediately upon delivery, in accordance with manufacturer's instructions, with seals and labels intact.

**6.16.5.8** The Contractor shall protect such products and materials until installed.

**6.16.5.9** The Contractor shall store products and materials, subject to damage by the elements, in Substantial weathertight enclosures. The Contractor shall maintain temperature and humidity within ranges stated in manufacturer's instructions.

**6.16.5.10** The Contractor shall be responsible for protection of stored material and for the safety of the Owner's employees and visitors from flammable and Hazardous Materials, odors, and tripping over stored materials or equipment.

**6.16.5.11** The Contractor shall provide the Owner with the full names of its employees who will use keys on campus including the employees of Subcontractors, prior to issue of any keys.

**6.16.5.12** The Contractor shall sign a key card in Building 17 (Monday-Friday, 7:00 a.m.-3:00 p.m.) 3 days before keys are available at the Owner's Campus Police Dispatch Desk in Building 7.

**6.16.5.13** The Contractors shall check in and out with the Owner's Campus Police Dispatch Desk in Building 7 when on campus performing Work.

**6.16.5.14** If the Contractor requires keys for the Work, such keys shall be provided at the Owner's Campus Police Dispatch Desk in Building 7. The Contractor shall pick up and return the keys to the Dispatch Desk daily.

**6.16.5.15** Contractors shall only have authorized access to the project site and ancillary areas approved by the Contracting Authority.

- .1 Some areas may require an Owner escort to be present during performance of the Work. Once an escort is scheduled, the Contractor shall proceed with Work in such areas.

**6.16.5.16** The Contractor shall practice professional courtesy and coordination with Separate Contractors at all times.

**6.16.5.17** The Contractor shall be on Site to accept Contractor's deliveries.

**6.16.5.18** The Owner shall not accept deliveries for the Contractor.

**6.16.5.19** Material deliveries shall be accepted by the Contractor before 3:00 p.m. Monday through Friday, so long as the delivery is not disruptive to the campus.

**6.16.5.20** The Contractor shall coordinate deliveries with the Owner for use of receiving docks.

**6.16.5.21** Deliveries shall not be made on Saturdays, Sundays, holidays, or after 3:00 p.m. during the week.

*Insert Section 6.16.6.1.1 as follows:*

- .1 The use of any and all tobacco products are prohibited on the Owner's property. These include, but are not limited to: cigarettes, chewing tobacco, vaping products, etc. The Owner's Campus Police Dispatch will be notified of any breaches of this regulation, which may result in a fine or penalty against the Contractor.

*Insert Section 6.16.7 and associated subsections as follows:*

**6.16.7** Parking.

**6.16.7.1** No complementary Contractor parking is available for the Project. The Contractor shall, at its sole expense and with no adjustment to the Contract Sum, use metered parking spaces or garages.

**6.16.7.2** The Contractor shall not park or drive on grass or plaza/paver areas without prior coordination and written approval from Planning & Construction.

**6.16.7.3** The Contractor shall not block entrance driveways or receiving docks for Building 6 or the area between Building 2 and Building 10.

**6.16.7.4** Vehicles parked in unauthorized areas shall be towed at the vehicle owner's sole expense.

*Insert Section 6.16.8 and associated subsections as follows:*

**6.16.8** Telecommunications and Other Technology.

**6.16.8.1** The Contractor shall not use the Owner's phone for personal calls.

**6.16.8.2** The Contractor shall not, under any circumstances, place long distance calls on the Owner's phones.

**6.16.8.3** The Contractor shall not unplug any of the Owner's computers or phones, without the Owner's prior written consent and coordination.

*Insert Section 6.16.9 and associated subsections as follows:*

**6.16.9** Weapons.

**6.16.9.1** Under no circumstances are weapons of any kind to be brought onto the Owner's property, regardless of the possession of licenses or carry permits. The Owner's Campus Police Dispatch will be notified of any breaches of this regulation, which may result in a fine or penalty against the Contractor.

*Insert Section 6.17.3 as follows:*

**6.17.3** The Contractor shall coordinate all utility shutdowns in advance with the Owner's Facilities Management Department and shall provide the Owner's Facilities Maintenance Department with at least 24 hours advance notice of such shutdowns.

*Insert Section 7.7.1.3.1 as follows:*

- .1 Failure by the Contractor to furnish notarized invoices for materials cost may result in the delay of the initiation of a Change Order.

*Delete Section 9.3.1.1 in its entirety.*

*Insert subparagraph 9.3.2.2 to read as follows:*

**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 (overhead and profit). Contractor's Fee shall be included in the totals for labor and materials.

*Delete Section 9.4.1.7 in its entirety.*

*Delete Section 9.8.2.6 in its entirety.*

**END OF DOCUMENT**

# Document 00 73 43 - Wage Rate Requirements

## State of Ohio Standard Requirements for Public Facility Construction

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### PREVAILING WAGE RATES

#### 1.1 Payment of Prevailing Wage Rates

**1.1.1** The Contractor shall pay the prevailing wage rates of the Project locality, as issued by the Ohio Department of Commerce, Wage and Hour Bureau to laborers and mechanics performing Work on the Project.

**1.1.2** The Contractor shall comply with the provisions, duties, obligations, and is subject to the remedies and penalties of ORC Chapter 4115.

**1.1.3** If the Contractor or its Subcontractors fail to comply with ORC Chapter 4115, the Contracting Authority may withhold payment pursuant to **Section 9.8.2.5** of the **General Conditions**. The Contractor is liable for violations committed by the Contractor or its Subcontractors to the extent provided in ORC Chapter 4115.

**1.1.4** The Contractor shall submit all payroll reports in compliance with the requirements of **Section 1.2** for all employees of the Contractor and of the Contractor's Subcontractors.

**1.1.5** By executing a Contract, the Contractor certifies that it based 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, which are inserted at the end of this Document.

#### 1.2 Prevailing Wage Rate Revisions

**1.2.1** The Contracting Authority shall, within 7 business days after receipt of a notice of a change in the prevailing wage rates, notify the Contractor of the change. The prevailing wage rates are available at the Ohio Department of Commerce's web site: <http://com.state.oh.us/>.

**1.2.2** The Contractor shall pay any revised wage rates issued during the term of the Contract.

#### 1.3 Payroll Schedule

**1.3.1** Within 10 days of the date of the Notice to Proceed, the Contractor shall provide the Contracting Authority's Prevailing Wage Coordinator a schedule of dates during the term of the Contract on which wages shall be paid to employees for the Project.

#### 1.4 Payroll Reports

**1.4.1** The Contractor shall submit payroll reports with each Contractor Payment Request, which reports shall be certified by the Contractor that the payroll is correct and complete, and that the wage rates shown are not less than those required by the Contract. The Contractor is responsible for submitting all payroll reports of its Subcontractors.

**1.4.1.1** Each payroll report shall indicate the period covered and include a list containing the name, address, and last four digits of the social security number of each employee of the Contractor and its Subcontractors paid for the Work.

**1.4.1.2** Each payroll report shall list the number of hours each employee worked each day on the Project during the reporting period, the total hours each week on the Project, the employee's hourly rate of pay, job classification, hourly rate of fringe benefits, and all deductions from wages and net pay.

**1.4.1.3** Each payroll report shall list each fringe benefit and state if it is paid as cash to the employee or to a named plan.

**1.4.1.4** The Contractor and its Subcontractors shall submit apprenticeship agreements for all apprentices utilized on the Project with the first payroll report from the Contractor or its Subcontractor that includes apprentices.

**END OF DOCUMENT**



## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-furnished/Contractor-installed (OFICI) products.
4. Owner-furnished/Owner-installed (OFOI) products.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.

##### B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

#### 1.2 PROJECT INFORMATION

##### A. Project Identification: FAC 24-28X, EMS Classroom & Sim Lab Bldg. 14.

1. Project Location: Sinclair College, 444 West 3rd Street, Dayton, Ohio 45402.

##### B. Owner: Sinclair College, 444 West 3rd Street, Dayton, Ohio 45402.

1. Owner's Representative:  
Chris Haring  
444 West 3<sup>rd</sup> Street  
Dayton, OH 45402  
Ph: (937) 512-2451  
[Chris.haring@sinclair.edu](mailto:Chris.haring@sinclair.edu)

##### C. A/E: SPGB Architects, LLC.

1. Architect's Representative:  
Chandra Wilson  
4333-A Tuller Road  
Dublin, OH 43017  
Ph: (614) 771-8963  
[cwilson@spgbarch.com](mailto:cwilson@spgbarch.com)

##### D. A/E's Consultants: A/E has retained the following design professionals, who have prepared

designated portions of the Contract Documents:

1. MEP Engineers: Heapy.
  - a. Engineer's Representative:  
Nick Andrews  
1400 W. Dorthy Ln  
Dayton, OH 45409  
Ph: (937) 224-0861  
[njandrews@heapy.com](mailto:njandrews@heapy.com)

### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
  1. Interior renovation of approximately 3,800 SF in the basement of Building 14. The existing building is Type II-B, Use Group B-Business & A-3 Assembly (accessory use). Renovations include selective demolition of non-structural partitions, new partitions, new wall, ceiling and floor finishes, new lighting, coordination with the installation of an ambulance simulator. Plumbing systems, mechanical ductwork, diffusers and fire protection sprinklers will be reworked to accommodate the new floor plan and other Work indicated in the Contract Documents.
- B. Type of Contract:
  1. Project will be constructed under a single prime contract.

### 1.4 WORK PERFORMED BY OWNER

- A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
  1. Installation of the Ambulance Simulator. Work under this Contract will be coordinated with the installation of the Ambulance Simulator including construction of walls surrounding the Ambulance Simulator, electrical connections, technology connections, plumbing connections and fire sprinkler connections.
- C. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.
  1. Installation of loose furnishings and systems furniture.



1.5 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
  2. Provide for delivery of Owner-furnished products to Project site.
  3. Upon delivery, inspect, with Contractor present, delivered items.
    - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
  4. Obtain manufacturer's inspections, service, and warranties.
  5. Inform Contractor of earliest available delivery date for Owner-furnished products.
- B. Contractor's Responsibilities: The Work includes the following, as applicable:
1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
  2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
  3. Receive, unload, handle, store, protect, and install Owner-furnished products.
  4. Make building services connections for Owner-furnished products.
  5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
  6. Repair or replace Owner-furnished products damaged following receipt.
- C. Owner-Furnished/Contractor-Installed (OFCI) Products:
1. Soap Dispenser.
  2. Signage.

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Each Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits on Use of Site: Confine construction operations to work area indicated on the drawings.
  2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

- b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

#### 1.7 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

#### 1.8 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 6:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: As coordinated with A/E and Owner.
  - 2. Hours for Utility Shutdowns: As coordinated with A/E and Owner.
  - 3. Hours for Noise Activity: As coordinated with A/E and Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
  2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.
- F. Offensive language, verbal or sexual harassment of guests, staff, students, or visitors will not be tolerated.
- G. Music: Use of radios, tape decks, compact disc players, and similar devices are not permitted on the Project site.
- H. Employee Screening: Comply with Owner's requirements for drug screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

#### 1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.

PART 2 - PRODUCTS (Not Used)  
PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## SECTION 012300 - ALTERNATES

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

#### 1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

#### 1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1- Double Doors @ E0024: Provide pair of doors 0024, frame & hardware and demolish existing door E0024 as indicated on Drawings and Specifications.

1. Base Bid: Maintain existing door E0024 in its current location and paint door and frame as indicated on Drawings and Specifications.
- B. Alternate No. 2 Renovate Open Office: Provide new work in Open Office 003B, Open Office 003C, Alcove 0026, Men's Restroom 0025, and Copy/Work 0014 as indicated on Drawings and Specifications.
1. Base Bid: Maintain existing to remain in Open Office 003B, Open Office 003C, Alcove 0026, Men's Restroom 0025, and Copy/Work 0014 as indicated on Drawings and Specifications.

END OF SECTION 012300

## 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.
- B. Related Requirements:
  - 1. Document 002113 "Supplementary Instructions" for requirements for substitution requests prior to award of Contract.
  - 2. Section 012300 "Alternates" for products selected under an alternate.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
  - 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.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying 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 form acceptable to A/E.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of 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 substitutions 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 as well as names and addresses of A/Es 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, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions 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.
3. A/E's Action: If necessary, A/E will request additional information or documentation for evaluation.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or A/E's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if A/E does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage 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.



1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: A/E will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, A/E will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Substitution request is fully documented and properly submitted.
  - c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - e. Requested substitution is compatible with other portions of the Work.
  - f. Requested substitution has been coordinated with other portions of the Work.
  - g. Requested substitution provides specified warranty.
  - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500



## 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. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
  - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

#### 1.3 MINOR CHANGES IN THE WORK

- A. A/E will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form supplied by A/E.

#### 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: A/E 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. Request for Proposal issued by A/E are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in the General Conditions after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include 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.

- e. Quotation Form: Use forms located at <https://ofcc.ohio.gov/project-resources/documents/forms>

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to A/E.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. 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.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use forms located at <https://ofcc.ohio.gov/project-resources/documents/forms>

## 1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Request for Proposal, A/E will issue a Change Order for signatures of Owner and Contractor on forms located at [Use forms located at https://ofcc.ohio.gov/project-resources/documents/forms](https://ofcc.ohio.gov/project-resources/documents/forms)

## 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: A/E may issue a Construction Change Directive on found at [Use forms located at https://ofcc.ohio.gov/project-resources/documents/forms](https://ofcc.ohio.gov/project-resources/documents/forms) 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600



## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Web-based Project management software package.
  - 6. Project meetings.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
  - 4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

#### 1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, A/E, or Contractor seeking information required by or clarifications of the Contract Documents.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

### 1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

### 1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
  - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.



- b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
- c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to A/E indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
6. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
7. Fire-Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

8. Review: A/E will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If A/E determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, A/E will so inform Contractor, who shall make suitable modifications and resubmit.
  9. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
  2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
  3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
  4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
  5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
  6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
  7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with A/E to review and resolve conflicts on the coordination drawings.
- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format:
    - a. Same digital data software program, version, and operating system as original Drawings.
  2. File Submittal Format: Submit or post coordination drawing files using PDF format.
  3. A/E will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. A/E makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    - b. Digital Data Software Program: Drawings are available in AutoCad 2018.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. A/E will return without response those RFIs submitted to A/E by other entities controlled by Contractor.
  2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. RFI number, numbered sequentially.
  2. RFI subject.
  3. Specification Section number and title and related paragraphs, as appropriate.
  4. Drawing number and detail references, as appropriate.
  5. Field dimensions and conditions, as appropriate.
  6. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  7. Contractor's signature.
  8. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Use form as supplied by Owner.
1. Attachments shall be electronic files in PDF format.
- D. A/E's Action: A/E will review each RFI, determine action required, and respond. RFIs received by A/E after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of A/E's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. A/E's action may include a request for additional information, in which case A/E's time for response will date from time of receipt by A/E of additional information.

3. A/E's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures" and the General Conditions.
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify A/E in writing.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
  1. Project name.
  2. Name and address of Contractor.
  3. Name and address of A/E.
  4. RFI number, including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date A/E's response was received.
  8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- F. On receipt of A/E's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify A/E if Contractor disagrees with response.

#### 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and A/E of scheduled meeting dates and times a minimum of ten working days prior to meeting.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and A/E, within three days of the meeting.
- B. Preconstruction Conference: A/E will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and A/E.
  1. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
  1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise A/E and Owner's Commissioning Authority of scheduled meeting dates.

2. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  3. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: A/E will schedule and conduct a project closeout conference, at a time convenient to Owner and A/E, but no later than 60 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, A/E, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - i. Submittal procedures.
    - j. Owner's partial occupancy requirements.
    - k. Installation of Owner's furniture, fixtures, and equipment.
    - l. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: A/E will conduct progress meetings at weekly intervals.
1. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Contactor working in adjacent spaces, and A/E, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
  - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
  - c. Review present and future needs of each contractor present.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

## SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. This Section includes Preliminary Construction Schedule, Baseline Schedule, Monthly Progress Schedules, and Recovery Schedules.
  - 1. For clarity, this Section uses the term Schedule Manager for activities performed by the Contractor (General Contracting).
  - 2. In its Base Bid, the Contractor shall include providing scheduling services to meet these requirements.
- B. Accepted Schedules will be used to plan organize, and execute the work, to measure the progress of the work, to coordinate and complete remaining work, to aid in evaluating time extensions, and to provide the basis for all progress payments.
- C. Failure to maintain Schedules in a contract compliant status may result in the Contracting Authority withholding payment until the schedule is accepted in accordance with Section 9.8 of the General Conditions.
- D. Related Sections:
  - 1. 01 10 00 – Summary.

#### 2.1 DEFINITIONS

- A. Construction Type 1 - Earth Moving: Construction activities include but not limited to excavation, grading, trenching, backfilling, landscaping.
- B. Construction Type 2 - Structures and Surfacing: Construction activities include but not limited to civil structures, engineered structures, architectural assemblies, pavements.

#### 3.1 SUBMITTALS

- A. 90-Day Preliminary Schedule with Narrative Report: Defines the Contractor's planned operations for the first 90 calendar days and shall be submitted for acceptance within 30 calendar days after the Notice to Proceed is issued.
- B. Baseline Schedule with Narrative Report: Defines the Contractor's planned operations for the duration of the contract to completion, issuance of the Certificate of Substantial Completion and shall be submitted for acceptance within 90 calendar days after the Notice to Proceed is issued.

- C. Monthly Progress Schedules with Narrative Report: Indicates deviations from the Baseline Schedule and the preceding Monthly Progress Schedule and/or Recovery Schedule as applicable with Narrative Report. The narrative report should include, but not limited to, logic changes, added/deleted activities and justification for changes made. Monthly Progress Schedules with Narrative Report shall be submitted at the last Progress Meeting of the month.
- D. Recovery Schedules with Narrative Report: Indicates revisions to a Monthly Progress Schedule to regain contract compliance with Milestone dates, date of Substantial Completion, date of Contract Completion, and deviations from the Baseline Schedule. Recovery Schedules with Narrative Report shall be submitted before the first Progress Meeting of the month. Recovery Schedule with Narrative Report is required if the preceding Monthly Progress Schedule with recorded adverse weather exceeds the Baseline Schedule's Milestone dates, date of Substantial Completion, and/or date of Contract Completion by calendar days greater than the recorded adverse weather days.
- E. Two-Week Look-Ahead Report: Reports the activities of the previous 7 calendar days, approximate percentage of total activity completed to date, and manpower loading-by-trade; activities anticipated in the succeeding 7 calendar days; and activities in the succeeding 7 calendar days thereafter. The Two-Week Look-Ahead Report shall be submitted at each Progress Meeting. Two-Week Look-Ahead Report activities are to correlate to activities within the construction schedule, including additional detail as necessary.
- F. Schedule Manager Resume: Submitted by email for acceptance no later than 7 calendar days after the Notice to Proceed.
- G. Schedule submittals are to be submitted as a live file in .XML format as well as a PDF for reference.
- H. Submittal Procedure for Schedules: Submitted through the Schedule Approvals business process in the State's web-based project management system, OAKS Capital Improvements (OCI).

#### 4.1 QUALIFICATIONS

- A. Schedule Manager: Minimum 5 years' experience in critical path method scheduling using Oracle's Primavera P6 software.

#### 5.1 SCHEDULE KICK-OFF MEETING

- A. The purpose of the Schedule Kick-Off Meeting is to review the contract requirements for construction scheduling including, but not limited to:
  - 1. Applicable delivery method template.
  - 2. Project calendars.
  - 3. Project Level Activity Codes.
  - 4. Minimum WBS breakdown.
  - 5. Anticipated project work sequence.
  - 6. Submission methodologies.



## PART 2 PRODUCTS

### 1.1 SCHEDULE SOFTWARE

- A. The computer software utilized by the Schedule Manager to produce the project schedules will be Oracle's Primavera P6 software, version 6 or later.

## PART 3 EXECUTION

### 1.1 CRITICAL PATH METHOD

- A. The Critical Path Method (CPM) of network calculations will be used to generate the schedule. The Schedule Manager shall provide project schedules (Preliminary, Baseline, Progress Updates, Recovery, etc.) in .XML formatting as well as a .PDF for reference. Note: The required formatting may be waived by the Project Manager if the Contractor's proposed alternate formatting is supported by exceptional circumstances, i.e., short contract duration (less than six months) with a single trade.

### 2.1 SCHEDULE STRUCTURE

- A. With the exception of the Preliminary Schedule submission, the Construction Schedule shall include an appropriate level of detail. Failure of the Schedule Manager to develop or update the schedule or provide resource information will result in the schedule not being accepted.
  - 1. Provide a standard project calendar working day schedule that shows the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the work per the contract. Show the order and interdependence of activities and the sequence for accomplishing the work. Describe all activities in sufficient detail so that the Contracting Authority can readily identify the work and measure the progress of each activity. The Baseline Schedule must reflect the scope of work, required phasing, Owner requirements, Owner activities as predecessors to Contractor activities, interim Milestone completion dates (as needed), Substantial Completion Finish on or Before Milestone, the Contract Completion Finish on or Before Milestone, and other project milestones established in the Contract Documents. Include activities for critical project submittals, working drawings, shop drawing preparation, review and approval time for submittals and shop drawings, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities.
  - 2. The Contractor shall be responsible for assuring all work, including all subcontractor work, is included in the Baseline Schedule. The Contractor shall be responsible for assuring that all work sequences are logical and that the schedule indicates a coordinated plan.
  - 3. Failure by the Contractor to include any element of work required for performance of the Contract shall not excuse the Contractor from completing all work within the required time. The Contracting Authority's review of the baseline schedule will be for compliance with the specifications and contract requirements. Acceptance by the Contracting Authority will not relieve the Contractor of any of their responsibilities for the accuracy or feasibility of the schedule. Omissions and errors will be corrected as described in paragraph 3.02.F. Project Level Activity Codes or paragraph 3.02.K. Milestones and will not affect the Contract Times.

B. Activity Durations:

1. Submit the following data to support the standard project calendar as it relates to durations. Failure of the Schedule Manager to include this data will delay the review of the submittal until the Contracting Authority receives the missing data.
  - a. The proposed number of working days per week.
  - b. The holidays to be observed during the life of the contract (by day, month, and year).
  - c. Exception dates set aside by the Owner as non-working days.
  - d. The planned number of shifts per day.
  - e. Break up the work into activities of a duration no longer than 20 workdays each, except as to non-construction activities (e.g., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities for which the contracting Authority may approve a longer duration.
  - f. Activity durations will be in whole days, do not include decimals in the duration. Do not represent the Owner requirements, erosion control, and other similar items as single activities extending to the Substantial Completion date. Break these Contract Items into component activities.

C. Activity Logic:

1. All activities, except the first activity, shall have a predecessor(s). All activities, except the final activity, shall have a successor(s).
2. Use only finish to start relationships with no leads or lags to link activities or using start to start relationships with lags no greater than the predecessor duration to link activities.
3. Use of finish-to-finish relationships is permitted when both activities are already lined with a start to start relationship.

D. Procurement Activities:

1. Prepare the schedule in chronological order of critical submittals. Show specification section of the submittal, name of Contractor and generic description of work covered. Include activities to cover the complete procurement process to include submittal, review, approval, resubmittal, re-review, procurement, fabrication, delivery, permits, and similar pre-construction work.

E. Project Level Resources:

1. Activities shall include a primary resource of estimated budgeted units indicating man hours associated with each activity.
2. Identification of manpower, material, or equipment restrictions, as well as any activity requiring unusual shift work, such as two shifts per day, six-day work week, specified overtime, or work at times other than regular days or hours shall clearly be identified in the Project Schedule as needed.
3. Critical or near Critical Paths resulting from the use of manpower or equipment restraints shall be kept to a minimum. Near Critical Paths are defined as paths having 10 workdays or less of total float.

F. Project Level Activity Codes:

1. All activities shall be assigned, at a minimum, the following Project Level Activity Codes.

- a. Responsibility indicating the party responsible to perform the work. Responsibility includes, but is not limited to, the contracting firm, the subcontracting firm, Contractor workforce or Agency performing a given task. Activities shall not belong to more than one responsible party.
  - b. Weather Dependent (Type 1, Type 2, or None).
  - c. Off hour work or unique shifting requirements.
- G. Project Level Calendars:
1. Only project level calendars are to be utilized. All project level calendars are to be set with the detailed work hours/day calculating from 8 am-5 pm, with the noon hour break for lunch and shall inherit no exceptions or holidays from global calendars. The project level calendar names shall be utilized to identify specific planned work hours on site (4' 10s, 5D, 6D, etc.) The contracting authority monitors progress on 1-day duration basis, it is the responsibility of the Contractor to execute the hours/resources needed to accomplish an activity in a given 1-day duration. No global data of any kind (codes, calendars, etc.) is to be used.
- H. Activity Default Settings:
1. An activity should have the below default activity settings. Any variances must be approved by the Contracting Authority.
    - a. Activity Type: Task Dependent.
    - b. Duration Type: Fixed Duration & Units.
    - c. % Complete Type: Duration.
- I. Schedule Group and Sort Organization:
1. Arrange the schedule to show each major area of construction for each major category or unit of work by Work Breakdown Structure (WBS) or Project Level Activity Codes. The schedule organization should have a minimum of three levels.
  2. All activity names shall include a reference to the group and sort associated which is agreed upon during the schedule kick off meeting. Activities shall not be allowed to cover more than one work area.
- J. Change Order or Claim Number:
1. Any scope revision which modifies the critical path, or impacts an interim date, or Substantial Completion date must be represented in the schedule as a fragnet. A fragnet is defined as a sequence of new activities, to include the associated change identifier (PCO, CO, RFI, etc.), that are proposed to be added to the existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to succeeding activities. The fragnet is to be added to the schedule at the progress update just prior to the known impact.
- K. Milestones:
1. Milestone dates are defined in calendar days following the date set forth in the Notice to Proceed and are required to be met by the Contractor. Time is of the essence for the completion of Milestones, Substantial Completion date, and for the Contract Completion date.

2. The following Milestone dates are defined in calendar days from the Notice to Proceed, with the exception of Substantial Completion and Contract Completion, and shall be adhered to by the Contractor:
  - a. Milestone M1- Anticipated Notice to Proceed (NTP) April 10 ,2025
  - b. Milestone M2-20 days from NTP coordination drawings are due to the A/E for review.
  - c. Milestone M3 – 120 days from NTP Substantial Completion of project.

L. Adverse Weather:

1. Definitions

- a. Adverse Weather Day: A day when the magnitude of a weather parameter (precipitation or temperature) is such that it creates conditions that inhibits the ability of the Contractor to work productively on critical construction activities.
- b. Expected Adverse Weather Days: The number of adverse weather days expected to occur on a monthly basis and defined for two different construction types (Type 1: Earth Moving and Type 2: Structures and Surfacing).
- c. Unexpected Adverse Weather Days: The number of adverse days that exceed the expected number of adverse weather days determined on a monthly basis. Also include number of days with lightning and/or high winds that inhibit the ability of the Contractor to work productively on critical construction activities as corroborated by the Contracting Authority. The Contractor is to notify the contracting authority within one month of a weather event.
- d. Actual Adverse Weather Days: The actual number of adverse weather days that occur during a single month.
- e. Precipitation: Rain, snow, or hail where 1” of rain equals 12” of snow.
- f. Calendar Day is based on all available days including weekends and holidays.
- g. Working Day is based on a five-day work week and excludes weekends and legal holidays.

2. Methodology

- a. Adverse Weather Days Criteria
  - 1) A single precipitation threshold of greater than 7.62 mm (0.30 in) determines an adverse weather day for Type 1 and Type 2 construction.
  - 2) A single precipitation threshold of greater than 19.05 mm (0.75 in) the previous day determines an adverse weather day/additional consecutive non-working day for Type 1 construction only.
  - 3) A single precipitation threshold of greater than 7.62 mm (0.30 inch) reached before shut-down determines an adverse weather day for Type 1 and Type 2 construction.
  - 4) A single daily maximum temperature threshold of less than 0 degrees C (32 degrees F) determines an adverse weather day for Type 1 & Type 2 construction.
  - 5) A combination of daily maximum temperature less than 0 degrees C (32 degrees F) and precipitation greater than 7.62 mm (0.30 inch) determines a single adverse weather day.
- b. Expected Adverse Weather Days

- 1) Calculate the average number of expected adverse weather calendar days per month based on 5 years of data from the nearest National Oceanic and Atmospheric Administration (NOAA) Land-Based Station for each construction type. Data can be found at the NOAA associated National Centers for Environmental Information (NCEI) web site at <https://www.ncei.noaa.gov/>.
- 2) Calculate the average number of expected adverse workdays per month by multiplying the average number of expected adverse weather calendar days per month by 5/7 and randomly, non-consecutive when possible, distribute the weather days throughout the project level weather calendars.

M. Scheduled Project Completion:

1. Project Start Date: The Construction Schedule may start no earlier than the date that the Notice to Proceed (NTP) was issued. The Schedule Manager shall include as the first activity in the Construction Schedule a Start Milestone called "Notice to Proceed." The "Notice to Proceed" activity shall have: a start constraint equal to the date that the NTP was issued.
2. Constraint of Last Activity: Completion of the last Finish Milestone in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the Critical Path. The Schedule Manager shall include as the last activity in the Project Schedule an activity called "Contract Complete". The completion milestones activity shall have a: Finish on or Before constraint, a constraint date equal to the Contract Completion milestone identified herein.
3. Project Details Must Finish By Date: The Schedule Manager shall set the "project details must finish by schedule date" to be equal to the "Contract Complete" date.

N. Interim Completion Dates (Milestones):

1. Contractually specified interim completion dates (Milestone dates) shall also be constrained to show negative float if early finish date of the last activity in that phase falls after the interim completion date.

O. Default Progress Data Disallowed:

1. Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM Scheduling Software. Actual Start and Finish dates and Remaining Durations on the CPM Schedule shall match those dates provided from Contractor Daily Reports for every in progress or completed activity and insure that the data contained on the Daily Reports is the sole basis for schedule updating. Failure to comply may result in the disapproval of schedule.

P. Out of Sequence Progress:

1. Activities that have posted progress without predecessors being completed (Out of Sequence Progress) shall be retained in the schedule only by the case by case concurrence of the Contracting Authority. The Contracting Authority may direct that changes in schedule logic be made to correct any or all Out of Sequence Work. Schedule must be calculated with the retained logic setting.

Q. Negative Lag(s):

1. Lag durations contained in the schedule shall not have a negative value unless approved by the Contracting Authority.

R. Definition of, and Conditions Relating to Float:

1. Float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity in the schedule. Total float is defined as the amount of time any given activity or path of activities may be delayed before it will affect the project completion time.
2. Float is not time for the exclusive use or benefit of the Contractor and shall be used in the best interest of completing the project on time.
3. Extensions of the Contract Times required under the General Conditions pertaining to equitable time adjustment will be granted only to the extent that the equitable time adjustment exceeds total float in the activity or path of activities affected at the time approval was issued for the change.
4. Use of float suppression techniques such as preferential sequences, special lead/lag logic restraints, extended activity times, or imposed dates, other than as required by the Contract, shall be cause for rejection of the Construction Schedule and any revisions or updates.

3.1 LAYOUTS / VIEWS

A. Each submitted schedule shall utilize the below layouts/views as stipulated by the Contracting Authority:

1. Preliminary Schedule Review.
2. Baseline Schedule Review.
3. Progress Review.
4. Progress vs. Baseline Comparison.
5. Progress vs. Previous Progress Comparison.
6. Progress vs. Previous Progress vs. Baseline Comparison.
7. Recovery Schedule vs. Previous Progress Comparison.
8. Baseline Finish Date.
9. Total Float.
10. Actual Start and Actual Finish dates shall be printed for those activities in progress or completed.

B. Activity ID Report: A list of all activities sorted according to Activity ID number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

C. Logic Report: A list of preceding and succeeding activities for every activity in ascending order by activity number and then sorted according to Early Start Date. For completed activities the Actual Start Date shall be used as the secondary sort.

D. Total Float Report: A list of all activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates.

#### 4.1 90-DAY PRELIMINARY CONSTRUCTION SCHEDULE

- A. The accepted Preliminary Construction Schedule shall be used for payment purposes and the basis for measuring Contractor progress not to exceed 90 days after Notice to Proceed is issued.
- B. Schedule Review and Comments:
  - 1. Comments made by the Contracting Authority on the Preliminary Construction Schedule during review shall not relieve the Contractor from compliance with the requirements of the Contract Documents.
  - 2. Following the Contractor's receipt of the Contracting Authority's review comments, the Contractor shall correct the schedule to identify missing activities and relationships relevant to the Scope of Work. No time extensions will be granted to complete activities not initially included in the Contractor's Preliminary Construction Schedule.
  - 3. To the extent that there are any conflicts between the accepted Preliminary Construction Schedule and the requirements of the Contract Documents, the Contract Documents shall govern.
- C. Resubmittal of Preliminary Construction Schedule:
  - 1. Should the Contracting Authority reject the Preliminary Construction Schedule, the Schedule Manager shall comply with the Contracting Authority's direction and resubmit the Preliminary Construction Schedule and all associated submittals within seven calendar days.

#### 5.1 BASELINE CONSTRUCTION SCHEDULE

- A. The Contracting Authority shall accept or reject, in writing, the Baseline Construction Schedule and the associated submittals. If the Baseline Construction Schedule is rejected, the Contracting Authority shall provide comments in writing to the Schedule Manager stating the reasons why the submission was not accepted.
- B. Acceptance of the baseline schedule does not revise the Contract Documents. The baseline schedule must be "accepted" or "accepted as noted" by the Contracting Authority prior to the Contracting Authority evaluating any Contractor claims associated with time impacts.
- C. The final schedule, bearing the approval signature of the contractor, shall be submitted in quadruplicate to the AE. Following approval by the College, copies of the final schedule shall be distributed to all interested parties. Tentative dates for interruption of utility services shall be incorporated. CPM Scheduling is required showing all subcontractors, Contractors and coordinated among all trades. The General Contractor will be responsible for coordinating and seek all input. The College may elect the right to hire a CPM Scheduling consultant to be paid by the college and turned over to such contractors for their use.

#### 6.1 MONTHLY PROGRESS SCHEDULES

- A. Construction Contract Adjustment for Unexpected Adverse Weather:
  - 1. Contract adjustment is justified when the number of actual adverse weather workdays exceeds the expected number of adverse weather workdays over the life of the project.

2. The number of actual adverse weather workdays as reported at the nearest NOAA Land-Based Station and related construction task(s) are to be reported on a monthly basis at the last Progress Meeting of the month as a condition of Payment Application approval.
3. The Contracting Authority is to verify with documentation the actual adverse weather workdays reported by the Contractor.
4. Execution: At the first Progress Meeting of each month the total number of actual adverse weather days is compared to the expected number of adverse weather days and reported by the Contracting Authority. If the number of actual adverse weather days exceeds the expected amount, then the difference is the potential days for extensions of the Contract Times due to weather. A running total will be kept for every month of the entire project. Once the project Substantial Completion date is reached, or the number of working days is completed, the Contactor may request that any net positive adverse weather days for the running total be awarded as a time extension.

7.1 DATA SUBMISSION

- A. The preliminary, baseline, progress, and recovery Construction Schedules shall be provided in the form of a .XML file prepared in Oracle’s Primavera P6 software.

<b>Table 1 – Schedule Filename Convention</b>			
<b>Schedule</b>	<b>1st Submission</b>	<b>2nd Submission</b>	<b>3rd Submission</b>
Preliminary Schedule	YY.MM.DD_PPP-000000_01PS	YY.MM.DD_PPP-000000_02PS	YY.MM.DD_PPP-000000_03PS
Baseline Schedule	YY.MM.DD_PPP-000000_01B	YY.MM.DD_PPP-000000_02B	YY.MM.DD_PPP-000000_03B
Progress Schedule #1	YY.MM.DD_PPP-000000_01SU01	YY.MM.DD_PPP-000000_02SU01	YY.MM.DD_PPP-000000_03SU01
Progress Schedule #2	YY.MM.DD_PPP-000000_01SU02	YY.MM.DD_PPP-000000_02SU02	YY.MM.DD_PPP-000000_03SU02
Delay Analysis	YY.MM.DD_PPP-000000_01TIA01	YY.MM.DD_PPP-000000_02TIA01	YY.MM.DD_PPP-000000_03TIA01
Weather Delay Analysis	YY.MM.DD_PPP-000000_01WD01	YY.MM.DD_PPP-000000_02WD01	YY.MM.DD_PPP-000000_03WD01
Recovery Schedule	YY.MM.DD_PPP-000000_01RS01	YY.MM.DD_PPP-000000_02RS01	YY.MM.DD_PPP-000000_P03RS01
YY – Project Year MM – Month DD – Day PPP-000000 – Project Number			

8.1 APPROVED CHANGES VERIFICATION

- A. Only Construction Schedule changes that have been previously accepted by the Contracting Authority shall be included in the schedule submission. The narrative report shall specifically reference, on an activity-by-activity basis, all changes made since the previous period and relate each change to documented, accepted schedule changes.



- B. The Contractor shall prosecute the work in accordance with the accepted Construction Schedule. Out of sequence construction, defined as a change from the Construction Schedule in the Contractor's actual operation requires prior concurrence from the Contracting Authority.
- C. Upon the approval of a Change Order or the issuance of a Change Directive by the Contracting Authority, the agreed upon change order activities, activity durations, logic and impacts shall be reflected in the next schedule submittal by the Schedule Manager.
- D. No change to the accepted activities, original activity durations, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the Construction Schedule shall be made without prior approval from the Contracting Authority. If the Contractor desires to make a change to the accepted Construction Schedule, the Contractor shall outline the revisions made within the updated narrative, stating the reasons for the change as well as the specifics, such as the proposed changes in activities, original activity durations, logic, interdependencies, milestones, planned sequence of operations, or resource loading of the baseline Construction Schedule. The Contracting Authority shall respond within three calendar days after the receipt of the Contractor's request.
- E. If the Contracting Authority considers the Construction Schedule change requested by the Contractor to be a major change, it may require the Contractor to revise and submit for acceptance, without additional cost to the Owner, all of the affected portions of the network diagrams, and any schedule reports, or construction equipment reports deemed necessary to show the probable effect on the entire project. The proposed network revision and required reports shall be submitted to the Contracting Authority within seven calendar days after the Contracting Authority notifies the Contractor that the requested revision is a major change. Only upon the approval of the requested change by the Contracting Authority may it be reflected in the next Construction Schedule update submitted by the Contractor.
- F. A change will be considered of a major nature if the time estimated for an activity or sequence of activities is varied from the original plan to the degree that there is reasonable doubt that the Substantial Completion date, Contract Completion date, or milestones will be met, or if the change impacts the work of Separate Contractors at the job site. Changes to activities having adequate float may be considered as minor changes, except that an accumulation of minor changes may be considered a major change when such changes affect the Substantial Completion date, Contract Completion date, or milestones.

END OF SECTION



## SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
1. Preconstruction photographs.
  2. Concealed Work photographs.
  3. Periodic construction photographs.
- B. Related Requirements:
1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
  2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
  3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

#### 1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
1. Submit photos thumb-drive or by uploading to web-based site. Include copy of key plan indicating each photograph's location and direction.
  2. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of A/E.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of location, vantage point, and direction.
    - g. Unique sequential identifier keyed to accompanying key plan.
- C. Video Recordings: Submit video recordings within seven days of recording.
1. Submit video recordings on CD-ROM or thumb drive Include copy of key plan indicating each video's location and direction.

2. Identification: With each submittal, provide the following information in file metadata tag:
  - a. Name of Project.
  - b. Name and contact information for photographer.
  - c. Name of A/E.
  - d. Name of Contractor.
  - e. Date video recording was recorded.
  - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
3. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in three-ring binders. Provide label on front and spine. Include a cover sheet with label information. Include name of Project and date of video recording on each page.

### 1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. Metadata: Record accurate date and time from camera.
- E. File Names: Name media files with date and Project area and sequential numbering suffix.

### 1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
  1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by A/E.
  1. The Contractor shall take digital photographs of all building features which will be disturbed during construction. These site features include all features actually disturbed during construction, whether or not they are anticipated to be disturbed at the beginning of construction or note. The photographs shall be sufficient detail to determine whether any features have been disturbed, altered, damaged, or replaced during construction.

- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
1. Underground utilities.
  2. Underslab services.
  3. Piping.
  4. Electrical conduit.
  5. Waterproofing and weather-resistant barriers.
  6. Fire stopping.

#### 1.5 CONSTRUCTION VIDEO RECORDINGS

- A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.
- B. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
1. Confirm date and time at beginning and end of recording.
  2. Begin each video recording with the name of Project, Contractor's name, videographer's name, and Project location.
- C. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from video recording opposite the corresponding narration segment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233



## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

##### B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require A/E's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require A/E's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

#### 1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list 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 A/E 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 Schedule: 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 Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule as required 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 A/E's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for installation.
  - i. Activity or event number.

#### 1.4 SUBMITTAL FORMATS

##### A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of A/E.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.



- B. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by A/E previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- C. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

## 1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Email: Prepare submittals as PDF package and transmit to A/E by sending via email. Include PDF transmittal form. Include information in email subject line as requested by A/E.
    - a. A/E will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- 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 unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of the need to review submittals concurrently for coordination.
    - a. A/E 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 A/E'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.
- D. 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 A/E's action stamp.

- E. 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.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from A/E's action stamp.

## 1.6 SUBMITTAL REQUIREMENTS

- 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 unsuitable 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 that show 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 Shop Drawings, and before or concurrently 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 unless submittal based on A/E's digital data drawing files is otherwise permitted.
  - 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.

- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
    - f. Specification paragraph number and generic name of each item.
  3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
  4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. A/E will return submittal with options selected.
  5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit three sets of Samples. A/E will retain one Sample sets; remainder will be returned.
      - 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 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. 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 A/E and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
  2. 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.
  3. 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.
  4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
  5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
  6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. 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 substrate preparation and primers required.
  2. 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.
  3. 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.
  4. 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.
  5. 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.

6. 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:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.

#### 1.7 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 insufficient to perform services or certification required, submit a written request for additional information to A/E.
- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file, 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.

#### 1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: 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 A/E.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include 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.
  1. A/E will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 A/E'S REVIEW

- A. Action Submittals: A/E will review each submittal, indicate corrections or revisions required, and return.
  - 1. PDF Submittals: A/E will indicate, via markup on each submittal, the appropriate action.
- B. Informational Submittals: A/E will review each submittal and will not return it, or will return it if it does not comply with requirements. A/E will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from A/E.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. A/E will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by A/E without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

## SECTION 013516 - ALTERATION PROJECT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes special procedures for alteration work.

#### 1.2 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the A/E's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by A/E.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep an element or detail secure and intact.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

### 1.3 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
1. Schedule construction operations in sequence required to obtain best Work results.
  2. Coordinate sequence of alteration work activities to accommodate the following:
    - a. Owner's continuing occupancy of portions of existing building.
    - b. Owner's partial occupancy of completed Work.
    - c. Other known work in progress.
    - d. Tests and inspections.
  3. Detail sequence of alteration work, with start and end dates.
  4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
  5. Use of elevator and stairs.
  6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

### 1.4 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.
1. Attendees: In addition to representatives of Owner, A/E, and Contractor, service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
  2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
    - a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Fire-prevention plan.
    - c. Governing regulations.
    - d. Areas where existing construction is to remain and the required protection.
    - e. Hauling routes.
    - f. Sequence of alteration work operations.
    - g. Storage, protection, and accounting for salvaged and specially fabricated items.



- h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
        - i. Qualifications of personnel assigned to alteration work and assigned duties.
        - j. Requirements for extent and quality of work, tolerances, and required clearances.
        - k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
  3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, A/E, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
  2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
    - a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
    - b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
      - 1) Interface requirements of alteration work with other Project Work.
      - 2) Status of submittals for alteration work.
      - 3) Access to alteration work locations.
      - 4) Effectiveness of fire-prevention plan.
      - 5) Quality and work standards of alteration work.
      - 6) Change Orders for alteration work.
  3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

## 1.5 INFORMATIONAL SUBMITTALS

### A. Alteration Work Subschedule:

1. Submit alteration work sub schedule within 30 days of date established for commencement of alteration work.
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.
- C. Alteration Work Program: Submit 30 days before work begins.
- D. Fire-Prevention Plan: Submit 30 days before work begins.

#### 1.6 QUALITY ASSURANCE

- A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
  1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.
- B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- C. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
  1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
  2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- D. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- E. Safety and Health Standard: Comply with ANSI/ASSP A10.6.

## 1.7 STORAGE AND HANDLING OF SALVAGED MATERIALS

### A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area indicated on Drawings or as designated by Owner.
5. Protect items from damage during transport and storage.

### B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label 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 unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

### C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by A/E, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

### D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

## 1.8 FIELD CONDITIONS

### A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."

### B. Discrepancies: Notify A/E of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

### C. Owner's Removals: Before beginning alteration work, verify in correspondence with Owner that the following items have been removed:

1. As indicated in the 011000 Summary of Work and as indicated on drawings.
- D. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

## PART 2 - PRODUCTS - (Not Used)

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
1. Use only proven protection methods, appropriate to each area and surface being protected.
  2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
  3. Erect temporary barriers to form and maintain fire-egress routes.
  4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
  5. Contain dust and debris generated by alteration work and prevent it from reaching the public or adjacent surfaces.
  6. Provide shoring, bracing, and support as necessary. Do not overload structural elements.
  7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
- B. Temporary Protection of Materials to Remain:
1. Protect existing materials with temporary protection and construction. Do not remove existing materials unless otherwise indicated.
  2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protection and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
1. Notify Owner, A/E, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
  2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.

3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify A/E immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
  2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

### 3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
1. Comply with NFPA 241 requirements unless otherwise indicated.
  2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
    - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
1. Obtain Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Owner at least 72 hours before each occurrence by filling out hot work permit, template immediately following this specification section.
  2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
  3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
  4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

- a. Train each fire watch in the proper operation of fire-control equipment and alarms.
  - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
  - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
  - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
  - e. Maintain fire-watch personnel at each area of Project site until two hours conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.
- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

### 3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

### 3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.

- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs or video recordings. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify A/E of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
  - 1. Do not proceed with the work in question until directed by A/E.

END OF SECTION 013516





## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by A/E, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

#### 1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. 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, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
  - 1. Mockups are used for one or more of the following:
    - a. Verify selections made under Sample submittals.
    - b. Demonstrate aesthetic effects.

- c. Demonstrate the qualities of products and workmanship.
  - d. Demonstrate successful installation of interfaces between components and systems.
  - e. Perform preconstruction testing to determine system performance.
2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. 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.
- J. 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. Contractor's quality-control services do not include contract administration activities performed by A/E.
- 1.3 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 A/E.
- B. Delegated Design Services Statement: Submit a statement 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

#### 1.4 CONFLICTING REQUIREMENTS

- A. **Conflicting Standards and Other Requirements:** If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the A/E regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to A/E for clarification before proceeding.
- B. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified is 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 A/E for a decision before proceeding.

#### 1.5 ACTION SUBMITTALS

- A. **Mockup Shop Drawings:**
  - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
  - 2. Indicate manufacturer and model number of individual components.
  - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. **Contractor's Quality-Control Plan:** For quality-assurance and quality-control activities and responsibilities.
- B. **Qualification Data:** For Contractor's quality-control personnel.
- C. **Testing Agency Qualifications:** For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. **Schedule of Tests and Inspections:** Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- E. **Reports:** Prepare and submit certified written reports and documents as specified.

- F. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

#### 1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to A. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work A/E has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, telephone number, and email address of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement of whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement of whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. 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.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
  - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. 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's Responsibilities:
  - 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. When testing is complete, remove test specimens and test assemblies, 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 A/E and Commissioning Authority, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by A/E.
3. Notify A/E seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain A/E's approval of mockups before starting corresponding Work, fabrication, or construction.
7. Promptly correct unsatisfactory conditions noted by A/E's preliminary review, to the satisfaction of the A/E, before completion of final mockup.
8. Approval of mockups by the A/E does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

L. The following is a list of certifications and other submittal required, in addition to guarantees, to assure quality materials or workmanship, or both by the Owner.

1. General Construction

Sealants	Experience record of contractor or subcontractor doing the work
Non-standard	Test reports and resilient floor manufacturer's certificate materials
Painting	Statements by paint manufacturer and applicator Manufacturer's certificate coatings
Fire-resistive	Manufacturer's certificate coatings
Laboratory equipment*	Financial statement of manufacturer, experience qualifications

2. Plumbing

Soil, waste, and vent piping	Inspection certificate
Interior piping	Test reports
Welders	Copy of certification
Water lines	Sterilization test report
Gas service and interior piping	Test reports and recording line charts for purging and pressure

3. Fire Protection

Fire department	Certification that pipe threads and connections are suitable for use with local hydrants and fire department equipment
Inspection	National Automatic Sprinkler agreement and Fire Control Association standard inspection and maintenance form
Fire lines and fire pumps	Test reports
Welders	Copy of certification
System	Fire Marshal's certification of inspection and acceptance

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. 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.
  2. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.



5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- 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 A/E and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify A/E and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  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 duties of Contractor.
- E. 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 Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
  - 1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
  - 2. Distribution: Distribute schedule to Owner, A/E, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

#### 1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying A/E and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to A/E with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected Work.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: 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 A/E.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for A/E's and authorities' having jurisdiction reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000



## SECTION 014200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey A/E's action on Contractor's submittals, applications, and requests, "approved" is limited to A/E's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by A/E. 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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- 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.

#### 1.2 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.
  - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

- 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.

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations, List: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  2. AAMA - American Architectural Manufacturers Association; (see FGIA).
  3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
  8. ACI - American Concrete Institute; [www.concrete.org](http://www.concrete.org).
  9. ACP - American Clean Power; (Formerly: American Wind Energy Association); [www.cleanpower.org](http://www.cleanpower.org).
  10. ACPA - American Concrete Pipe Association; [www.concretepipe.org](http://www.concretepipe.org).
  11. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
  12. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
  13. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  14. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
  15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  16. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
  17. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
  18. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
  19. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
  20. AITC - American Institute of Timber Construction; (see PLIB).
  21. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  22. AMPP - Association for Materials Protection and Performance; [www.ampp.org](http://www.ampp.org).
  23. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); [www.analyzeseeds.com](http://www.analyzeseeds.com).
  25. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).

26. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
27. API - American Petroleum Institute; [www.api.org](http://www.api.org).
28. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
29. ASA - Acoustical Society of America; [www.acousticalsociety.org](http://www.acousticalsociety.org).
30. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
33. ASME - ASME International; American Society of Mechanical Engineers (The); [www.asme.org](http://www.asme.org).
34. ASSE - ASSE International; (American Society of Sanitary Engineering); [www.asse-plumbing.org](http://www.asse-plumbing.org).
35. ASSP - American Society of Safety Professionals; [www.assp.org](http://www.assp.org).
36. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
37. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
38. AVIXA - Audiovisual and Integrated Experience Association; [www.avixa.org](http://www.avixa.org).
39. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
41. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
42. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
43. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
44. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
45. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
46. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
47. BIFMA - Business and Institutional Furniture Manufacturer's Association; [www.bifma.org](http://www.bifma.org).
48. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
49. BWF - Badminton World Federation; [www.bwfbadminton.com](http://www.bwfbadminton.com).
50. CARB - California Air Resources Board; [www.arb.ca.gov](http://www.arb.ca.gov).
51. CDA - Copper Development Association Inc.; [www.copper.org](http://www.copper.org).
52. CE - Conformite Europeenne (European Commission); [www.ec.europa.eu/growth/single-market/ce-marking](http://www.ec.europa.eu/growth/single-market/ce-marking).
53. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
54. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
55. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
56. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
57. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
58. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
59. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
60. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
61. CPA - Composite Panel Association; [www.compositepanel.org](http://www.compositepanel.org).
62. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
63. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
64. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
65. CSA - CSA Group; [www.csagroup.org](http://www.csagroup.org).
66. CSI - Cast Stone Institute; [www.caststone.org](http://www.caststone.org).
67. CSI - Construction Specifications Institute (The); [www.csiresources.org](http://www.csiresources.org).
68. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
69. CTA - Consumer Technology Association; [www.cta.tech](http://www.cta.tech).

70. CTI - Cooling Technology Institute; [www.coolingtechnology.org](http://www.coolingtechnology.org).
71. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
72. DHA - Decorative Hardwoods Association; [www.decorativehardwoods.org](http://www.decorativehardwoods.org).
73. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
74. ECIA - Electronic Components Industry Association; [www.ecianow.org](http://www.ecianow.org).
75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
77. EOS/ESD - EOS/ESD Association, Inc.; Electrostatic Discharge Association; [www.esda.org](http://www.esda.org).
78. ESTA - Entertainment Services and Technology Association; [www.esta.org](http://www.esta.org).
79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
80. FCI - Fluid Controls Institute; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).
81. FGIA - Fenestration and Glazing Industry Alliance; <https://fgiaonline.org>.
82. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
83. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
84. FM Approvals - FM Approvals LLC; [www.fmapprovals.com](http://www.fmapprovals.com).
85. FM Global - FM Global; [www.fmglobal.com](http://www.fmglobal.com).
86. FRSA - Florida Roofing and Sheet Metal Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
87. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
88. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
89. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
92. HMMA - Hollow Metal Manufacturers Association; (see NAAMM).
93. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
94. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
95. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
96. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
97. ICPA - International Cast Polymer Association (The); [www.theicpa.com](http://www.theicpa.com).
98. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
99. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
100. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
101. IES - Illuminating Engineering Society; [www.ies.org](http://www.ies.org).
102. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
103. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
104. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.org](http://www.igshpa.org).
105. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
106. Intertek - Intertek Group; [www.intertek.com](http://www.intertek.com).
107. ISA - International Society of Automation (The); [www.isa.org](http://www.isa.org).
108. ISFA - International Surface Fabricators Association; [www.isfanow.org](http://www.isfanow.org).
109. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
110. ITU - International Telecommunication Union; [www.itu.int](http://www.itu.int).
111. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
112. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
113. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
114. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
115. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
116. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).



117. MHI - Material Handling Industry; [www.mhi.org](http://www.mhi.org).
118. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
119. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
120. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.; [www.msshq.org](http://www.msshq.org).
121. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
122. NACE - NACE International; (National Association of Corrosion Engineers International); (see AMPP).
123. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
124. NAIMA - North American Insulation Manufacturers Association; [www.insulationinstitute.org](http://www.insulationinstitute.org).
125. NALP - National Association of Landscape Professionals; [www.landscapeprofessionals.org](http://www.landscapeprofessionals.org).
126. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
127. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
128. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
129. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
130. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
131. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
132. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
133. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
134. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
135. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
136. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
137. NFPA - NFPA International; (see NFPA).
138. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
139. NGA - National Glass Association; [www.glass.org](http://www.glass.org).
140. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
141. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
142. NOFMA - National Oak Flooring Manufacturers Association; (see NWFA).
143. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
144. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
145. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
146. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
147. NSI - Natural Stone Institute; [www.naturalstoneinstitute.org](http://www.naturalstoneinstitute.org).
148. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
149. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
150. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
151. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
152. NWRA - National Waste & Recycling Association; [www.wasterecycling.org](http://www.wasterecycling.org).
153. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
154. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
155. PLASA - PLASA; [www.plasa.org](http://www.plasa.org).
156. PLIB - Pacific Lumber Inspection Bureau; [www.plib.org](http://www.plib.org).
157. PVCPA - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
158. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
159. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
160. RIS - Redwood Inspection Service; (see WWPA).
161. SAE - SAE International; [www.sae.org](http://www.sae.org).
162. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).

163. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
164. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
165. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (see ASCE).
167. SIA - Security Industry Association; [www.securityindustry.org](http://www.securityindustry.org).
168. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
169. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
171. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
172. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
173. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
174. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
175. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
176. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
177. SSPC - SSPC: The Society for Protective Coatings; (see AMPP).
178. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; [www.steeltank.com](http://www.steeltank.com).
179. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
180. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
181. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
182. TCNA - Tile Council of North America, Inc.; [www.tcnatile.com](http://www.tcnatile.com).
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.kbcdco.tema.org](http://www.kbcdco.tema.org).
184. TIA - Telecommunications Industry Association (The); [www.tiaonline.org](http://www.tiaonline.org).
185. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
186. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
187. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
188. TRI - Tile Roofing Industry Alliance; [www.tilerroofing.org](http://www.tilerroofing.org).
189. UL - Underwriters Laboratories Inc.; [www.ul.org](http://www.ul.org).
190. UL LLC - UL LLC; [www.ul.com](http://www.ul.com).
191. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
192. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
193. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
194. WA - Wallcoverings Association; [www.wallcoverings.org](http://www.wallcoverings.org).
195. WCLIB - West Coast Lumber Inspection Bureau; (see PLIB).
196. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
197. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
198. WI - Woodwork Institute; [www.woodworkinstitute.com](http://www.woodworkinstitute.com).
199. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
200. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).
5. OBC - Ohio Building Code

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200



## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### 1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities to be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, A/E, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling,

storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
  2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
  3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
1. Locations of dust-control partitions at each phase of work.
  2. HVAC system isolation schematic drawing.
  3. Location of proposed air-filtration system discharge.
  4. Waste-handling procedures.
  5. Other dust-control measures.
- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by Owner. Include the following:
1. Methods used to meet the goals and requirements of Owner.
  2. Concrete cutting method(s) to be used.
  3. Location of construction devices on the site.
  4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
  5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with Owner.
  6. Indicate locations of sensitive research and equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

## 1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.
- B. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### 2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system.
  - 1. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  - 2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

### 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.



- B. Sanitary Facilities: Provide wash facilities, safety shower and eyewash facilities, for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained daily in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
  - 1. Utilize designated area within existing building for temporary field offices.
  - 2. Maintain support facilities until A/E schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- E. Waste Disposal Facilities:
  - 1. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- G. Limited Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. Coordinate use of elevator with Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
  2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- H. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- D. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- G. Temporary Signage: Provide temporary signage for wayfinding, elevator and stair use as required for the project and listed in other portions of the specification. Provide signage on

dumpster stating Name of Contractor and for Contractor use only. The Owner has the right to request additional for wayfinding and facility use from the signage allowance.

- H. Covered Walkway: Erect protective covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.
  - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
  - 2. Paint and maintain appearance of walkway for duration of the Work.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
  - 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 3. Insulate partitions to control noise transmission to occupied areas.
  - 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  - 5. Protect air-handling equipment.
  - 6. Provide walk-off mats at each entrance through temporary partition.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

- L. Temporary Roof Protection: The Contractor shall provide protection for any roof area(s) that will be affected by the project. Protection shall consist of using  $\frac{3}{4}$ -inch thick plywood with foam board attached. The composite board shall be laid with the form towards the roof surface and shall be arranged to protect the roof from falling objects and materials. The protective covering shall be secured in a non-destructive fashion to avoid dislocation in inclement weather. This protection shall not relieve the Contractor from responsibility to repair any damage to the roof resulting from their work.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000



## SECTION 016000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The Work of This Section Includes: Administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
  - 2. Section 012300 "Alternates" for products selected under an alternate.
  - 3. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 4. Section 014200 "References" for applicable industry standards for products specified.
  - 5. Section 017700 "Closeout Procedures" for submitting warranties.

#### 1.2 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products unless otherwise indicated.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  - 1. Evaluating Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements

for purposes of evaluating comparable products of additional manufacturers named in the specification.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  - 2. Data indicating compliance with the requirements specified in "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

### 1.3 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.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
  - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is inconspicuous.
  - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.



3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

#### 1.4 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

#### 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 that products are undamaged and properly protected.

- C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. 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 are to 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of Owner or endorsed by manufacturer to Owner.
  2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Section 017700 "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 meeting requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," A/E will make selection.
  5. Descriptive, performance, and reference standard requirements in Specifications establish salient characteristics of products.
  6. **Or Equal:** For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by A/E in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by A/E, whose determination is final.
- B. **Product Selection Procedures:**

1. Sole 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.
  - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole 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.
  - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
  - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
  - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

7. 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 may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require the phrase "match A/E's sample," provide a product that complies with requirements and matches A/E's sample. A/E's decision will be final on whether a proposed product matches.
  1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by A/E from manufacturer's full range" or a similar phrase, select a product that complies with requirements. A/E will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: A/E will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, A/E may return requests without action, except to record noncompliance with the following requirements:
  1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects, with project names and addresses and names and addresses of A/E and owners, if requested.
  5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
  - 1. Installation.
  - 2. Cutting and patching.
  - 3. Coordination of Owner's portion of the Work.
  - 4. Progress cleaning.
  - 5. Starting and adjusting.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.
  
- B. Related Requirements:
  - 1. Section 011000 "Summary" for coordination of Owner-performed work and Owner's separate contracts, and limits on use of Project site.
  - 2. Section 013300 "Submittal Procedures" for submitting surveys.
  - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
  - 4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
  - 5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### 1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
  
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

#### 1.3 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
  - 1. Prior to submitting cutting and patching plan review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform A/E of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

- a. Contractor's superintendent.
  - b. Trade supervisor responsible for cutting operations.
  - c. Trade supervisor(s) responsible for patching of each type of substrate.
  - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

#### 1.4 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify A/E of locations and details of cutting and await directions from A/E before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  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 the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Plumbing piping systems.
    - f. Mechanical systems piping and ducts.
    - g. Control systems.
    - h. Communication systems.
    - i. Fire-detection and -alarm systems.
    - j. Conveying systems.
    - k. Electrical wiring systems.
    - l. 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 that 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. Sprayed fire-resistive material.

- e. Equipment supports.
  - f. Piping, ductwork, vessels, and equipment.
  - g. 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 A/E's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. 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 A/E for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where

indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. 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.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to A/E in accordance with requirements in Section 013100 "Project Management and Coordination."

### 3.3 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb, and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.



3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by A/E. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by A/E.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by A/E. Fit exposed connections together to form hairline joints.

### 3.4 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. 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.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. 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.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. 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. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 5. Proceed with patching after construction operations requiring cutting are complete.
- H. 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, as judged by A/E. 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 eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even

surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, 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, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.5 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors 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.

### 3.6 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." and Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300



## SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Recycling fluorescent bulbs and ballasts.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.

#### 1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### 1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- C. Refrigerant Recovery: Comply with requirements in Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Comply with requirements in 024119 "Selective Demolition."
- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section.
- B. Owner reserves the right to salvage any item deemed of value to the Owner to re-purpose.
- C. Contractor shall work with Owner to find other uses for demolished items to keep as much material from landfill as possible.
- D. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024119 "Selective Demolition."
  - 2. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - 3. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - 4. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.



## PART 2 - PRODUCTS

## PART 3 - EXECUTION

### 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

### 3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  - 3. Store items in a secure area until installation.
  - 4. Protect items from damage during transport and storage.
  - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

### 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
  - a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

### 3.4 RECYCLING DEMOLITION WASTE

- A. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- B. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- C. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- D. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

### 3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
  1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  2. Polystyrene Packaging: Separate and bag materials.
  3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

### 3.6 RECYCLING BULBS AND BALLASTS

- A. General Requirements:

1. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances, and regulations.
2. The Department of Environmental Health and Safety (EHS) is available to advise on or assist in the collection and disposal of all hazardous waste. Prior to commencing work, submit the name and capabilities of recycling facilities to the Owner for approval. At a minimum include recycling of fluorescent bulbs and ballasts.
3. Comply with applicable federal, state, and local noise control laws, ordinances and regulations, including but not limited to 29 CFR, Part 1910.95 and 29 CFR, Part 1926.52.

B. Specific Requirements:

1. Where fluorescent light bulbs and ballasts are removed, unless the fluorescent light bulbs and ballasts are going to be re-used, these items need to be carefully removed intact, and properly managed:
  - a. Immediately place fluorescent bulbs in Contractor provided cardboard boxes designed for the storage of fluorescent bulbs. Each box must be marked as "Universal Waste Fluorescent Bulbs", as required by the EPA, including the date and count of bulbs contained in the box. This would include all other types of light bulbs such as incandescent, sodium, mercury, etc.
  - b. Any bulbs broken during the removal and collection process must be immediately cleaned up and collected in appropriate containers acceptable for transportation and recycling by the recycling facility.
  - c. Remove light ballasts, clip wires from the ends, and collect in appropriate DOT approved containers.
  - d. These materials cannot be disposed as demolition waste. Tape boxes closed and store in a centralized area marked with barrier tape and signs denoting "Universal Waste Storage Area".
  - e. Contractor is responsible for the handling and transport of bulbs and ballasts to submitted Ohio EPA listed recycler. Transportation shall be in accordance with all applicable DOT and EPA regulations.
  - f. Documents showing the proper handling, transport and receipt of materials to the recycling facilities must be included in the Contractor's closeout documents, and shall include a copy of the recycling certificate noting the quantity of bulbs and ballasts recycled. A copy of this documentation shall be forwarded to Owner.
  - g. All costs associated with management and recycling shall be the responsibility of the Contractor.

### 3.7 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.

- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final Completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
- B. Related Requirements:
  - 1. Section 013233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
  - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
  - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 4. Section 017900 "Demonstration and Training" for requirements to train Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

#### 1.2 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the A/E's use prior to A/E's inspection, to determine if the Work is substantially complete.

#### 1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

## 1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by A/E Label with manufacturer's name and model number.
  - 5. Submit testing, adjusting, and balancing records.
  - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  - 6. Advise Owner of changeover in utility services.
  - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 9. Complete final cleaning requirements.

10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

## 1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
  1. Certified List of Incomplete Items: Submit certified copy of A/E's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by A/E. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
  2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  3. Submit Final Completion photographic documentation.

## 1.8 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  1. Organize list of spaces in sequential order, listed by room or space number.
  2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of A/E.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. PDF Electronic File: A/E will return annotated file.

## 1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of A/E for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - 1. Submit by email to A/E.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.



- i. Vacuum and mop concrete.
  - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
  - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - l. Remove labels that are not permanent.
  - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
  - q. Clean strainers.
  - r. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

### 3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700



## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. A/E will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:

1. Submit one electronic PDF version.
  2. Submit one paper copy to Owner.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. A/E will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. A/E will return copy with comments.
1. Correct or revise each manual to comply with A/E comments. Submit copies of each corrected manual within 15 days of receipt of A/E's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### 1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components

of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

#### 1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:
  1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for A/E.
  7. Name and contact information for Commissioning Authority.
  8. Names and contact information for major consultants to the A/E that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

#### 1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
  - 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
  - 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
  - 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

#### 1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

## 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent,

and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- D. **Manufacturers' Maintenance Documentation:** Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- E. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- F. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.
- I. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.



- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

#### 1.10 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

1.11 MAINTENANCE OF OPERATION AND MAINTENANCE MANUALS

- A. Maintenance of Operation and Maintenance Manuals: Store Operation and Maintenance Manuals in the field office apart from the Contract Documents used for construction. The manuals shall be submitted as equipment and systems are installed and prior to Demonstration and Training. The Operation and Maintenance Manuals to be in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Operation and Maintenance Manuals for A/E's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS (AS-BUILTS)

### 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 Project Record Documents, including the following:
  - 1. Record Drawings (As-Built).
  - 2. Record specifications (As-Built).
- B. Related Requirements:
  - 1. Section 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record (as-built) prints or annotated PDF electronic file
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and Contract modifications.

#### 1.4 RECORD DRAWINGS (AS-BUILT DRAWINGS)

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

- b. Accurately record information in an acceptable drawing technique.
  - c. Record data as soon as possible after obtaining it.
  - d. Record and check the markup before enclosing concealed installations.
  - e. Cross-reference record prints to corresponding photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Depths of foundations.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Change Directive.
  - k. Changes made following A/E's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints (As-Built).
4. Mark record prints (as-built prints) with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing (As-Built); include the designation "PROJECT AS- BUILT DRAWING" in a prominent location.

#### 1.5 RECORD SPECIFICATIONS (AS BUILT)

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. Note related Change Orders and Record Drawings (As-Built Drawings) where applicable.
- B. Format: Submit record (As-Built) specifications as annotated PDF electronic file or paper copy.

1.6 MAINTENANCE OF RECORD DOCUMENTS (AS-BUILT DOCUMENTS)

- A. Maintenance of Record Documents: Store Record Documents (As-Built Documents) in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for A/E's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839



## SECTION 017900 - DEMONSTRATION AND TRAINING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
  - 2. Demonstration and training video recordings.

#### 1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit one copy within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of A/E.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Date of video recording.
  - 2. Transcript:
    - a. Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet

with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.

- b. Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  1. Inspect and discuss locations and other facilities required for instruction.
  2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  3. Review required content of instruction.
  4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by A/E.



## 1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Systems and equipment operation manuals.
    - c. Systems and equipment maintenance manuals.
    - d. Product maintenance manuals.
    - e. Project Record Documents.
    - f. Identification systems.
    - g. Warranties and bonds.
    - h. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  - 4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Control sequences.
    - f. Safety procedures.
    - g. Instructions on stopping.

- h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning.
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

## 1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017900



## SECTION 024119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. The Work of this Section Includes:

1. Demolition and removal of selected portions of exterior or interior of building or structure and site elements.
2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.
3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

#### 1.2 DEFINITIONS

- A. Remove: (Demo/ Demolish) Detach items from existing construction and legally dispose of off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage; prepare for reuse; and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed.

#### 1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

#### 1.4 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

#### 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 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.
6. Review and finalize protection requirements.
7. Review procedures for noise control and dust control.
8. Review storage, protection, and accounting for items to be removed for salvage or reinstallation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and , for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Temporary interruption of utility services. Indicate how long utility services will be interrupted.
  3. Coordination for shutoff, capping, and continuation of utility services.
  4. Use of elevator and stairs.
  5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed in accordance with EPA regulations. Include name and address of technician and date refrigerant was recovered.
- E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

#### 1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Universal certified by an EPA-approved certification program.

#### 1.8 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.
  - 1. Before selective demolition, Owner will remove the following items:
    - a. Loose furniture and equipment.
- C. Notify A/E of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials:
  - 1. It is not expected that hazardous materials will be encountered in the Work.
    - a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify A/E and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. On-site sale of removed items or materials is not permitted.

## 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/ASSP 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 Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video, measured drawings. Comply with Section 013233 "Photographic Documentation."

1. Inventory and record the condition of items to be removed for salvage or reinstallation. Photograph or video conditions that might be misconstrued as damage caused by removal.
2. Photograph or video existing conditions of adjoining construction including finish surfaces, that might be misconstrued as damage caused by selective demolition operations or removal of items for salvage or reinstallation.

### 3.2 PREPARATION

- A. Temporary Shoring: Design, 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.
- B. 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."
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by A/E, items may be removed to a suitable, protected storage location and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- D. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment in accordance with 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.3 UTILITY SERVICES AND BUILDING SYSTEMS

- A. Existing Services/Systems to Remain: Maintain utilities and building systems and equipment to remain and protect against damage during selective demolition operations.
  1. Maintain fire-protection facilities in service during selective demolition operations.

### 3.4 SALVAGE/REINSTALL

- A. Removed and Salvaged Items:



1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

B. 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.

### 3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to 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. 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 during and for at least 12 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. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide

alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

### 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

#### A. Concrete:

1. Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
2. Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive in accordance with recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

### 3.8 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 024119

## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.

#### 1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

#### 1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

#### 1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

## PART 2 - PRODUCTS

### 2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Size of Channels: 1-5/8 by 1-5/8 inches.

### 2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
  - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- F. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

### 2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.

## 2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form exposed work with accurate angles and surfaces and straight edges.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- E. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- G. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## 2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
  - 1. Provide bearing plates welded to beams where indicated.
  - 2. Drill or punch girders and plates for field-bolted connections where indicated.
  - 3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

## 2.6 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.

- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  - 1. Cast Aluminum: Heavy coat of bituminous paint.
  - 2. Extruded Aluminum: Two coats of clear lacquer.

#### 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

END OF SECTION 055000





## SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Wood products.
  2. Fire-retardant-treated lumber.
  3. Miscellaneous lumber.

#### 1.2 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.

#### 1.3 ACTION 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 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.
  2. 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 in accordance with ASTM D5664.
  3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
  2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products 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

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content:
  - 1. Boards: 15 percent.
  - 2. Dimension Lumber: 15 percent unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED LUMBER

- A. General: Where fire-retardant-treated materials are indicated, materials are to comply 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 in accordance with ASTM E84, 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. Treatment is not to promote corrosion of metal fasteners.
  - 2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
  - 3. Design Value Adjustment Factors: Treated lumber is to be tested according to ASTM D5664 and design value adjustment factors are to be calculated according to ASTM D6841.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.
  - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

- D. Application: Treat all rough carpentry unless otherwise indicated.

### 2.3 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Utility Shelving: Lumber with 15 percent maximum moisture content of any of the following species and grades:
1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
  2. Mixed southern pine or southern pine; No. 1 grade; SPIB.
  3. Hem-fir or hem-fir (north); Select Merchantable or No. 1 Common grade; NLGA, WCLIB, or WWPA.
  4. Spruce-pine-fir (south) or spruce-pine-fir; Select Merchantable or No. 1 Common grade; NeLMA, NLGA, 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 furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

### 2.4 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC58 ICC-ES AC308 as appropriate for the substrate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. 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.
- D. Sort and select lumber so that natural characteristics do 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.
- E. Comply with AWWA 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.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. 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 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for 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.
- B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

END OF SECTION 061000

## SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Miscellaneous materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

#### 1.2 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

A. Product Data:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Miscellaneous materials.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

- C. Samples for Initial Selection: For each type of exposed finish.

D. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
  - a. Provide one sample applied to core material with specified edge material applied to one edge.
2. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Premium.
- C. Type of Construction: Face frame.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: ISO 4586-3, grades as indicated or if not indicated, as required by quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ABET Inc.
    - b. Formica Corporation.
    - c. Laminart LLC.
    - d. Pionite; a Panolam Industries International, Inc. brand.
    - e. Wilsonart LLC.
- F. Exposed Surfaces:
  - 1. Plastic-Laminate Grade: HGS.
  - 2. Edges: Grade HGS PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
  - 3. Pattern Direction: As indicated.
- G. Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: Thermally fused laminate panels.
    - a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
    - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, ISO 4586-3, grade to match exposed surface.
  - 2. Drawer Sides and Backs: Solid-hardwood lumber.
  - 3. Drawer Bottoms: Hardwood plywood.
- H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless

located directly under tops.

- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, ISO 4583-3, grade to match exposed surface.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated on the drawings.

## 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Particleboard (Medium Density): ANSI A208.1, Grade M-2-Exterior Glue.
  - 2. Softwood Plywood: DOC PS 1, medium-density overlay.
  - 3. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of ISO 4586.

## 2.3 CABINET HARDWARE AND ACCESSORIES

- A. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
  - 1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.
- B. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
- C. Catches: Roller catches, ANSI/BHMA A156.9, B03071.
- D. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- E. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- F. Drawer Slides: ANSI/BHMA A156.9.



1. Standard Duty (Grade 1 and Grade 2): Side mount.
  2. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.
    - a. Type: Full extension.
    - b. Material: Aluminum slides.
    - c. Motion Feature: Soft close dampener.
  3. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
  4. File drawers more than 6 inches high or more than 24 inches wide, provide 100 lb load capacity.
  5. Lateral file drawers more than 6 inches high and more than 24 inches but not more than 30 inches wide, provide 150 lb load capacity.
  6. Lateral file drawers more than 6 inches high and more than 30 inches wide, provide 200 lb load capacity.
  7. Computer keyboard tray, provide 75 lb load capacity.
- G. Door Locks: ANSI/BHMA A156.11, E07121.
- H. Drawer Locks: ANSI/BHMA A156.11, E07041.
- I. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- J. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
  1. Color: Black.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
  1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.
- 2.4 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Type I, waterproof type as selected by fabricator to comply with requirements.

## 2.5 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

### 3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration

into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116



## SECTION 078100 - APPLIED FIRE PROTECTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Sprayed fire-resistive materials.

#### 1.2 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Framing plans or schedules, or both, indicating the following:
  - 1. Extent of applied fire protection for each construction and fire-resistance rating.
  - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
  - 3. Minimum applied fire protection material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
  - 4. Treatment of sprayed fire-resistive material after application.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of applied fire protection material for tests performed by a qualified testing agency.
- B. Research Reports: For each type of applied fire protection material, from an agency acceptable to authorities having jurisdiction.
- C. Preconstruction Test Reports: For each type of applied fire protection material.
- D. Field Quality-Control Reports: For each type of applied fire protection material.
- E. Qualification Statements: For Installer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by applied fire protection material manufacturer as experienced and with sufficient trained staff to install manufacturer's products in accordance with specified requirements.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
  - 1. Bond Strength: Test for cohesive and adhesive strength in accordance with ASTM E736/E736M. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 2. Density: Test for density in accordance with ASTM E605/E605M. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with applied fire protection material.
  - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, obtain applied fire protection material manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply applied fire protection when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain applied fire protection from single source.

2.2 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide applied fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.
- B. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL

263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. Asbestos: Provide products containing no detectable asbestos.

### 2.3 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Carbolite Company; a subsidiary of RPM International.
  - b. GCP Applied Technologies Inc.
  - c. Isolatek International.
  - d. Southwest Fireproofing Products Co.
2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing in accordance with ASTM E736/E736M.
3. Density: Not less than density specified in the approved fire-resistance design, in accordance with ASTM E605/E605M.
4. Thickness: As required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design or ASTM E605/E605M, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: ASTM E136.
6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - a. Flame-Spread Index: 10 or less.
  - b. Smoke-Developed Index: 10 or less.
7. Compressive Strength: Minimum 10 lbf/sq. in. in accordance with ASTM E761/E761M.
8. Corrosion Resistance: No evidence of corrosion in accordance with ASTM E937/E937M.
9. Deflection: No cracking, spalling, or delamination in accordance with ASTM E759/E759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination in accordance with ASTM E760/E760M.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours in accordance with ASTM E859/E859M.
12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21 or rating of 10 in accordance with ASTM D3274 when tested in accordance with ASTM D3273.
13. Finish: Spray-textured finish.

## 2.4 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved in writing by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:
  - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Product iQ" online directory or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests in accordance with ASTM E736/E736M.
- C. Bonding Agent: Product approved in writing by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Product iQ" online directory or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, in accordance with fire-resistance designs indicated and sprayed fire-resistive material manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.
- E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.
- F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by sprayed fire-resistive material manufacturer. Include pins and attachment.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.
  - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of applied fire protection with substrates under conditions of normal use or fire exposure.
  - 2. Verify that objects penetrating applied fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.



3. Verify that substrates receiving applied fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Verify that concrete work on steel deck is complete before beginning Work.
- C. Conduct tests in accordance with sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of applied fire protection materials during application.
- B. Clean substrates of substances that could impair bond of applied fire protection.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive applied fire protection.
- D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of applied fire protection. Remove minor projections and fill voids that would telegraph through applied fire protection after application.

### 3.3 APPLICATION

- A. Construct applied fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting applied fire protection Work.
- B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fire protection with other construction to minimize need to cut or remove applied fire protection.
  1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
  2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

- D. Metal Decks:
1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.
  2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.
- E. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.
- F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- G. Extend applied fire protection in full thickness over entire area of each substrate to be protected.
- H. Install body of applied fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.
- I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection that differs in color from that of encapsulant over which it is applied.
- J. Where sealers are used, apply products that are tinted to differentiate them from applied fire protection over which they are applied.
- K. Provide a uniform finish complying with description indicated for each type of applied fire protection material and matching finish approved for required mockups.
- L. Cure applied fire protection in accordance with sprayed fire-resistive material manufacturer's written instructions.
- M. Do not install enclosing or concealing construction until after applied fire protection has been inspected, tested, and corrections have been made to deficient applications.
- N. Finishes: Where indicated, apply fire protection to produce the following finishes:
1. Manufacturer's Standard Finishes: Finish in accordance with manufacturer's written instructions for each finish selected.
  2. Spray-Textured Finish: Finish left as spray applied with no further treatment.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Test and inspect as required by the IBC, Subsection 1705.15, "Sprayed Fire-Resistant Materials" as indicated on Schedule of Special Inspections.
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with

application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

- C. Applied fire protection will be considered defective if it does not pass tests and inspections.
  - 1. Remove and replace applied fire protection that does not pass tests and inspections, and retest.
  - 2. Apply additional applied fire protection, in accordance with manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

### 3.5 CLEANING

- A. Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

### 3.6 PROTECTION

- A. Protect applied fire protection from damage resulting from construction operations or other causes in accordance with manufacturer's and Installer's written instructions, so applied fire protection is without damage or deterioration at time of Substantial Completion.

### 3.7 REPAIRS

- A. As installation of other adjacent construction proceeds, inspect applied fire protection and repair damaged areas due to work of other trades before concealing it with other construction.
- B. Repair applied fire protection using same method and materials as original installation or using manufacturer's recommended trowel-applied repair product.

END OF SECTION 078100



## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Latex joint sealants.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

A. Product Data:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Mildew-resistant joint sealants.
4. Latex joint sealants.

- B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.

4. Proposed test.
  5. Number of samples required.
- B. Preconstruction Laboratory Test Reports: For each joint sealant and substrate material to be tested from sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- C. Sample warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Manufacturers' special warranties.
- B. Installer's special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

#### 1.7 MOCKUPS

- A. 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.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
  3. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
  4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  5. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.

6. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

## 1.9 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.

## 1.10 WARRANTY

- A. Special Installer's Warranty: 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: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants 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 stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from 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. Colors of Exposed Joint Sealants: As selected by A/E from manufacturer's full range.

## 2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. GE Construction Sealants; Momentive Performance Materials Inc.
    - b. Pecora Corporation.
    - c. Sika Corporation - Building Components.
    - d. The Dow Chemical Company.
    - e. Tremco Incorporated.

## 2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

## 2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Pecora Corporation.
    - b. PPG Paints; PPG Industries, Inc.
    - c. Sherwin-Williams Company (The).
    - d. Tremco Incorporated.

## 2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, 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.

## 2.6 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 performance of the Work.
- 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.
  - 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 C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type 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 in accordance with 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 in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

#### 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200



## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

#### 1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

#### 1.3 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

A. Product Data:

1. Interior standard steel doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
1. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
- B. Field quality-control reports.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

#### 1.8 QUALITY ASSURANCE

- A. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place

on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## PART 2 - PRODUCTS

### 2.1 HOLLOW METAL DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; AADG, Inc.; ASSA ABLOY.
2. Curries, AADG, Inc.; ASSA ABLOY Group.
3. Mesker Door; Mesker Openings Group.
4. Steelcraft; Allegion plc.
5. Superior Fireproof Door Company.

### 2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

### 2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.
1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule on Drawings.
    - b. Thickness: 1-3/4 inches.
    - c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch.
    - d. Edge Construction: Model 1, Full Flush.
    - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
    - f. Core: Kraft-paper honeycomb Vertical steel stiffener.
    - g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.
  2. Frames:
    - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
    - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
    - c. Construction: Full profile welded.

3. Exposed Finish: Prime.

## 2.4 BORROWED LITES

- A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch.
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

## 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
  3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
  1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

## 2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.



- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- D. 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 hollow-metal frames of type indicated.
- E. Glazing: Comply with requirements in Section 088000 "Glazing."

## 2.7 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted hairline joints.
  - 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
  - 2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
  - 3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

4. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

## 2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  1. 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.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
  3. Floor Anchors: Secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
    - a. Coat back of frames in masonry walls with asphaltic mastic.

5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
  2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
  3. Smoke-Control Doors: Install doors in accordance with NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

### 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to A/E.
- B. Inspections:
  1. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

### 3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Flush access doors with concealed flanges.

##### B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for heating and air-conditioning duct access doors.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.

### PART 2 - PRODUCTS

#### 2.1 ACCESS DOORS AND FRAMES

##### A. Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ACUDOR Products, Inc.
  - b. Babcock-Davis.
  - c. Cendrex Inc.
  - d. JL Industries; Activar Construction Products Group, Inc.
  - e. Larsen's Manufacturing Company.
2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: As indicated on the drawings.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Stainless Steel Sheet for Door: Nominal 0.062 inch, 16 gage, ASTM A480/A480M No. 4 finish.
7. Frame Material: Same material and thickness as door.
8. Latch and Lock: Cam latch, screwdriver operated.

## 2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- D. Stainless Steel Flat Bars: ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.

## 2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
  - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Latch and Lock Hardware:
  - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

## 2.4 FINISHES

- A. Comply with NAAMM/NOMMA AMP 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless Steel Finishes:
  - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
  - 2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
    - a. Run grain of directional finishes with long dimension of each piece.
    - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION OF ACCESS DOORS AND FRAMES

- A. Comply with manufacturer's written instructions for installing access doors and frames.

#### 3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113





## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.01 SUMMARY

##### A. Section includes:

1. Mechanical and electrified door hardware.
2. Electronic access control system components.

##### B. Section excludes:

1. Windows.
2. Cabinets (casework), including locks in cabinets.
3. Signage.
4. Toilet accessories.
5. Overhead doors.

##### C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry."
3. Division 06 Section "Finish Carpentry."
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
  - a. "Metal Doors and Frames."
  - b. "Flush Wood Doors."
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

#### 1.02 REFERENCES

##### A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

##### B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature

4. Installation Guide for Doors and Hardware
- C. NFPA – National Fire Protection Association
1. NFPA 70 – National Electric Code
  2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
  3. NFPA 101 – Life Safety Code
  4. NFPA 105 – Smoke and Draft Control Door Assemblies
  5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
  2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
  3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
  4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
  5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

### 1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
  - a. Wiring Diagrams: For power, signal, and control wiring and including:
    - 1) Details of interface of electrified door hardware and building safety and security systems.
    - 2) Schematic diagram of systems that interface with electrified door hardware.
    - 3) Point-to-point wiring.
    - 4) Risers.
3. Samples for Verification: If requested by A/E, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
  - a. Samples will be returned to supplier. Units that are acceptable to A/E may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
    - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    - c. Indicate complete designations of each item required for each opening, include:
      - 1) Door Index: door number, heading number, and A/E's hardware set number.
      - 2) Quantity, type, style, function, size, and finish of each hardware item.
      - 3) Name and manufacturer of each item.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each hardware set cross-referenced to indications on Drawings.
      - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for hardware.
      - 8) Door and frame sizes and materials.
      - 9) Degree of door swing and handing.
      - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
  5. Key Schedule:
    - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
  2. Provide Product Data:
    - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

- a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
- b. Catalog pages for each product.
- c. Final approved hardware schedule edited to reflect conditions as installed.
- d. Final keying schedule
- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. Fire door assemblies, in compliance with NFPA 80.
  - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, A/E, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to A/E and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
  - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with A/E and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
  - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.

- b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
    - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
  3. Electrified Door Hardware
    - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
  4. Accessibility Requirements:
    - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      - 2) Preliminary key system schematic diagram.
      - 3) Requirements for key control system.
      - 4) Requirements for access control.
      - 5) Address for delivery of keys.
  2. Pre-installation Conference
    - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Inspect and discuss preparatory work performed by other trades.
    - c. Inspect and discuss electrical roughing-in for electrified door hardware.
    - d. Review sequence of operation for each type of electrified door hardware.
    - e. Review required testing, inspecting, and certifying procedures.
    - f. Review questions or concerns related to proper installation and adjustment of door hardware.
  3. Electrified Hardware Coordination Conference:
    - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

#### 1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

#### 1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    - a. Mechanical Warranty.
      - 1) Locks.
        - a) Sargent 8200 Series: 7 years.
      - 2) Exit Devices.
        - a) Von Duprin: 10 years.
      - 3) Closers.

- a) LCN 4000 Series: 30 years.
- b. Electrical Warranty.
  - 1) Exit Devices.
    - a) Von Duprin: 3 years.

#### 1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
  - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to A/E's approval.

#### 2.02 MATERIALS

- A. Fabrication
  - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
  - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.

3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the A/E where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
  2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
  3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

- A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
    - a. Ives 5BB series.
  2. Acceptable Manufacturers and Products:
    - a. Hager BB1191/1279 series.
    - b. McKinney TB series.
- B. Requirements:
1. Provide hinges conforming to ANSI/BHMA A156.1.
  2. Provide five knuckle, ball bearing hinges.
  3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
    - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
    - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
  4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
    - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
    - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
  5. 2 inches or thicker doors:
    - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
    - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
  6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
  7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.



8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins

## 2.04 ELECTRIC POWER TRANSFER

### A. Manufacturers:

1. Scheduled Manufacturer and Product:
  - a. Von Duprin EPT-10.
2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.05 MORTISE LOCKS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Sargent 8200 series.
2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
3. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.

7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
  - a. Provide levers that return to within 1/2 inch (13 mm) of door face.
  - b. Lever Design: LE1J.

## 2.06 EXIT DEVICES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Von Duprin 99/33A series.
2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by A/E.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Provide electrified options as scheduled.
13. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
15. Special Options:
  - a. CVC
    - 1) Provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
      - a) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.

- b) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
- c) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper- infiltrated steel, with molybdenum disulfide low friction coating.
- d) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
- e) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
- f) Product Cycle Life: 1,000,000 cycles.
- g) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
- h) Latch release does not require separate trigger mechanism.
- i) Cable and latching system characteristics:
  - i. Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
  - ii. Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
  - iii. Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
  - iv. Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
  - v. Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

## 2.07 POWER SUPPLIES

### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. Schlage/Von Duprin PS900 Series.
- 2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

- 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
- 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by A/E.
- 3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
- 4. Provide power supplies with the following features:
  - a. 12/24 VDC Output, field selectable.

- b. Class 2 Rated power limited output.
- c. Universal 120-240 VAC input.
- d. Low voltage DC, regulated and filtered.
- e. Polarized connector for distribution boards.
- f. Fused primary input.
- g. AC input and DC output monitoring circuit w/LED indicators.
- h. Cover mounted AC Input indication.
- i. Tested and certified to meet UL294.
- j. NEMA 1 enclosure.
- k. Hinged cover w/lock down screws.
- l. High voltage protective cover.

## 2.08 CYLINDERS

### A. Manufacturers:

1. Scheduled Manufacturer and Product:
  - a. Best.
2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

## 2.09 KEYING

### A. Scheduled System:

1. Existing factory registered system:
  - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

### B. Requirements:

1. Construction Keying:
  - a. Replaceable Construction Cores.
    - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      - a) 3 construction control keys.
      - b) 12 construction change (day) keys.
    - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
2. Permanent Keying:

- a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
  - 1) Master Keying system as directed by the Owner.
- b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
- c. Provide keys with the following features:
  - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm).
- d. Identification:
  - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
  - 2) Identification stamping provisions must be approved by the A/E and Owner.
  - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
  - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
  - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
  - 1) Permanent Control Keys: 3.
  - 2) Master Keys: 6.
  - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently.
  - 4) Key Blanks: Quantity as determined in the keying meeting.

## 2.10 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 4040XP series.
2. Acceptable Manufacturers and Products:
  - a. No Substitute.

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.

6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

## 2.11 DOOR TRIM

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives.
2. Acceptable Manufacturers:
  - a. Rockwood.
  - b. Trimco.

### B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.12 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturers:
  - a. Glynn-Johnson.
2. Acceptable Manufacturers:
  - a. No Substitute.

### B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

## 2.13 DOOR STOPS AND HOLDERS

### A. Manufacturers:

1. Scheduled Manufacturer:
    - a. Ives.
  2. Acceptable Manufacturers:
    - a. Rockwood.
    - b. Trimco.
- B. Provide door stops at each door leaf:
1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
  2. Where a wall stop cannot be used, provide universal floor stops.
  3. Where wall or floor stop cannot be used, provide overhead stop.
  4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

#### 2.14 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
1. Scheduled Manufacturer:
    - a. Zero International.
  2. Acceptable Manufacturers:
    - a. No Substitute.
- B. Requirements:
1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
  2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
  3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
  4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

#### 2.15 SILENCERS

- A. Manufacturers:
1. Scheduled Manufacturer:
    - a. Ives.
  2. Acceptable Manufacturers:
    - a. Rockwood.
    - b. Trimco.
- B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

## 2.16 ROLLER LATCHES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives.
2. Acceptable Manufacturers:
  - a. Rockwood.
  - b. Trimco.

### B. Requirements:

1. Provide roller latches with 4-7/8 inches (124 mm) strike at single doors to fit ANSI frame prep. If dummy levers are used in conjunction with roller latch mount roller latch at a height as to not interfere with proper mounting and height of dummy lever.
2. Provide roller latches with 2-1/4 inches (57 mm) full lip strike at pair doors. Mount roller in top rail of each leaf per manufacturer's template.

## 2.17 DOOR POSITION SWITCHES

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Schlage.
2. Acceptable Manufacturers:
  - a. GE-Interlogix.
  - b. Sargent.

### B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

## 2.18 FINISHES

### A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D).
2. Protection Plates: BHMA 630 (US32D).
3. Overhead Stops and Holders: BHMA 630 (US32D).
4. Door Closers: Powder Coat to Match.



5. Wall Stops: BHMA 630 (US32D).
6. Weatherstripping: Clear Anodized Aluminum.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  2. Custom Steel Doors and Frames: HMMA 831.
  3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A.
  4. Installation Guide for Doors and Hardware: DHI TDH-007-20.
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Furnish permanent cores to Owner for installation.
  
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
  - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by A/E.
  - 5. Connections to panel interface modules, controllers, and gateways.
  - 6. Testing and labeling wires with A/E.
  
- K. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.
  
- L. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by A/E.
  
- M. Overhead Stops/holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
  
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by A/E.
  
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
  
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
  
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
  
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the A/E with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Abbreviation	Name
B/O	By Others
BES	Best Locking Systems
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SAR	Sargent Manufacturing Co
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

125548 OPT0405751 Version 1

Hardware Set No. 01

For use on mark/door #(s):

0014

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	70-7-8237-LE1J (F05)	630	SAR
1	EA	PERMANENT CORE	1C7*2	626	BES
1	EA	OH STOP	100S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 02

For use on mark/door #(s):

0018

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	70-7-8204-LE1J (F04)	630	SAR
1	EA	PERMANENT CORE	1C7*2	626	BES
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 03

For use on mark/door #(s):

0021A            0021B            0022A            0022B

Each to have:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	70-7-49-8238-LE1J (F32)	630	SAR
2	EA	PERMANENT CORE	1C7*2	626	BES
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

REGULAR ARM MOUNTED DOOR CLOSER - INSTALL DOOR CLOSER ON PULL SIDE OF THE DOOR.

Hardware Set No. 04

For use on mark/door #(s):

0022

Each to have:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	70-7-8226-LE1J (F14)	630	SAR
2	EA	PERMANENT CORE	1C7*2	626	BES
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 05

For use on mark/door #(s):

0023

Each to have:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	MORTISE LOCK	70-7-8204-LE1J (F04)	630	SAR
1	EA	PERMANENT CORE	1C7*2	626	BES
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

REGULAR ARM MOUNTED DOOR CLOSER - INSTALL DOOR CLOSER ON PULL SIDE OF THE DOOR.

Hardware Set No. 06

For use on mark/door #(s):

0024

Each to have:

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	ROLLER LATCH	RL30 TOP MOUNTED	626	IVE
2	EA	BTB DOOR PULLS	PR 9266F 36" N	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 07

For use on mark/door #(s):

0025

Each to have:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8305 10" 4" X 16" F	630	IVE
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

REGULAR ARM MOUNTED DOOR CLOSER - INSTALL DOOR CLOSER ON PULL SIDE OF THE DOOR.

Hardware Set No. 08

For use on mark/door #(s):

0026

Each to have:

3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	99-L-BE-03	626	VON
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

REGULAR ARM MOUNTED DOOR CLOSER - INSTALL DOOR CLOSER ON PULL SIDE OF THE DOOR.

Hardware Set No. AC-01

For use on mark/door #(s):

0016B            0016C

Each to have:

6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HDWE	RX-9949-L-BE-M996-03-FSE-LBL-CON	626	VON
1	EA	ELEC PANIC HDWE	RX-9949-L-M996-03-FSE-LBL-CON	626	VON
1	EA	RIM CYLINDER	1E72 AS REQ'D	626	BES
2	EA	SURFACE CLOSER	4040XP EDA ST-1754	689	LCN
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	GASKETING	870AA-S	AA	ZER
2	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	MEETING STILE	55AA X 555AA	AA	ZER
2	EA	MOUNTING BRACKET	870SPB		ZER
2	EA	WIRE HARNESS	CON-192		SCH
2	EA	WIRE HARNESS	CON-26P		SCH
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 120/240 VAC		VON
		PROX/CARD READER	CREDENTIAL READER		B/O

DOORS REQUIRE SPECIAL UNDERCUT FOR AUTOMATIC DOOR BOTTOMS.

INSTALL PERIMETER SOUND SEALS BEFORE DOOR CLOSERS AND MOUNTING BRACKETS.

DESCRIPTION OF OPERATION:

PRESENTING VALID CREDENTIAL TO READER WILL RELEASE BOTH LEVER TRIMS FOR ACCESS.

EMERGENCY ACCESS BY MECHANICAL KEY OVERRIDE.

REQUEST TO EXIT AND DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

FREE EGRESS AT ALL TIMES.

Hardware Set No. EX-01  
For use on mark/door #(s):  
E0024

Each to have:

NOTE

EXISTING OPENING TO REMAIN

END OF SECTION





## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Glass products.
  - 2. Miscellaneous glazing materials.

#### 1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

#### 1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review temporary protection requirements for glazing during and after installation.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.
- B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

## 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. NGA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
  - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AGC Glass Company North America, Inc.
    - b. Cardinal Glass Industries, Inc.
    - c. Guardian Glass LLC.
    - d. Pilkington North America; NSG Group.
    - e. Saint-Gobain Glass Corp.
    - f. Vitro Architectural Glass.
- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

## 2.5 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
  - 1. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
  - 1. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
  - 1. Type recommended in writing by sealant or glass manufacturer.
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

### 3.7 MONOLITHIC GLASS SCHEDULE

- A. Clear Glass Type GL-1: Annealed float glass.
  1. Minimum Thickness: 6 mm.
  2. Safety glazing required.
- B. Clear Glass Type GL-1T: Fully tempered float glass.
  1. Minimum Thickness: 6mm.
  2. Safety glazing required.

END OF SECTION 088000





## SECTION 090190.52 - MAINTENANCE REPAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes maintenance repainting as follows:
  - 1. Patching substrates.
  - 2. Repainting.
- B. Related Requirements:
  - 1. Section 013516 "Alteration Project Procedures" for general remodeling, renovation, repair, and maintenance requirements.
  - 2. Section 09 91 24 "Interior Painting (MPI Standards) for paint products.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 SEQUENCING AND SCHEDULING

- A. Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:
  - 1. Dismantle existing surface-mounted objects and hardware except items indicated to remain in place. Tag items with location identification and protect.
  - 2. Verify that temporary protections have been installed.
  - 3. Examine condition of surfaces to be painted.
  - 4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
  - 5. Apply paint system.
  - 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include recommendations for product application and use.
  - 2. Include test data substantiating that products comply with requirements.
- B. Product List: For each paint 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.

2. Printout of current "MPI Approved Products List" for each MPI-product category specified in paint systems, with the proposed product highlighted.
3. VOC content.

#### 1.5 QUALITY ASSURANCE

- A. Color Matching: Custom computer-match paint colors to colors indicated. For colors indicated by a standardized coding system, obtain a color chip for each color indicated from the color-coding-system company; computer match paint colors to the color chips.
- B. Mockups: Prepare mockups of maintenance repainting processes for each type of coating system and substrate indicated and each color and finish required to demonstrate aesthetic effects and to set quality standards for materials and execution. Duplicate appearance of approved Sample submittals.
  1. Locate mockups on existing surfaces where directed by A/E.
  2. Surface-Preparation Mockups: On existing surfaces using applicable specified methods of cleaning and other surface preparation, provide mockup sample of at least 100 sq. ft.
  3. Coating Mockups: Two surfaces of at least 100 sq. ft. to represent surfaces and conditions for application of each type of coating system under same conditions as the completed Work.
  4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
  5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing of cleaning materials, compatibility of paint coatings and systems for each type of painted surface.
  1. Use test areas as indicated and representative of proposed materials and existing construction.
  2. Propose changes to materials and methods to suit Project.

#### 1.7 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 daily.

## PART 2 - PRODUCTS

### 2.1 PREPARATORY CLEANING MATERIALS

- A. Water: Potable.
- B. Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent that contains no ammonia, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for every 5 gal. of solution required.
- C. Mildewcide: Commercial proprietary mildewcide or a job-mixed solution prepared by mixing 1/3 cup of household detergent that contains no ammonia, 1 quart of 5 percent sodium hypochlorite bleach, and 3 quarts of warm water.

### 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.

### 2.3 PATCHING MATERIALS

- A. Gypsum-Plaster Patching Compound: Finish coat plaster and bonding compound according to ASTM C842 and manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
  - 1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
  - 2. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
  - 3. Neutralize and collect alkaline and acid wastes before disposal.
  - 4. Dispose of runoff from operations by legal means and in a manner that prevents soil

erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

### 3.2 MAINTENANCE REPAINTING, GENERAL

- A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by A/E from building interior at 5 feet away from painted surface and from building exterior at 20 feet away from painted surface.
- B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:
  - 1. Remove failed coatings and corrosion and repaint.
  - 2. Verify that substrate surface conditions are suitable for repainting.
  - 3. Allow other trades to repair items in place before repainting.

### 3.3 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.
- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
  - 1. Concrete: 12 percent.
  - 2. Gypsum Board: 12 percent.
  - 3. Masonry (Clay and CMU): 12 percent.
  - 4. Portland Cement Plaster: 12 percent.
- C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
  - 1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify A/E in writing.
- E. 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.

### 3.4 PREPARATORY CLEANING

- A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.
- B. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and bristle brushes. Scrub surface with detergent solution and bristle brush until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet. Rinse with water applied by clean rags or sponges.
- C. Solvent Cleaning: Use solvent cleaning to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before other preparation work. Wipe surfaces with solvent using clean rags and sponges. If necessary, spot-solvent cleaning may be employed just prior to commencement of paint application, provided enough time is allowed for complete evaporation. Use clean solvent and clean rags for the final wash to ensure that all foreign materials have been removed. Do not use solvents, including primer thinner and turpentine, that leave residue.
- D. Mildew: Clean off existing mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. Rinse with water applied by clean rags or sponges.
- E. Mechanical Rust Removal:
  - 1. Remove rust with specified abrasives for ferrous-metal cleaning. Clean to bright metal.
  - 2. Wipe off residue with mineral spirits and either steel wool or soft rags.
  - 3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
  - 4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

### 3.5 SUBSTRATE REPAIR

- A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.
- B. Wood Substrate:
  - 1. Repair wood defects including dents and gouges more than 1/8 inch in size and all holes and cracks by filling with wood-patching compound and sanding smooth. Reset or remove protruding fasteners.
  - 2. Where existing paint is allowed to remain, sand irregular buildup of paint, runs, and sags to achieve a uniformly smooth surface.
- C. Cementitious Material Substrate:
  - 1. General: Repair defects including dents and chips more than 1/4 inch in size and all holes and cracks by filling with cementitious patching compound and sanding smooth. Remove protruding fasteners.
  - 2. Concrete, Cement Plaster, and Other Cementitious Products: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. If surfaces are too alkaline to paint, correct this condition before painting.

D. Gypsum-Plaster and Gypsum-Board Substrates:

1. Repair defects including dents and chips more than 1/8 inch in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.

E. Metal Substrate:

1. Preparation: Treat repair locations by wire-brushing and solvent cleaning. Use mechanical rust removal method to clean off rust.
2. Defects in Metal Surfaces: Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than 1/16 inch deep or 1/2 inch across and all holes and cracks by filling with metal-patching compound and sanding smooth. Remove burrs and protruding fasteners.
3. Priming: Prime iron and steel surfaces immediately after repair to prevent flash rusting. Stripe paint corners, crevices, bolts, welds, and sharp edges. Apply two coats to surfaces that are inaccessible after completion of the Work.

### 3.6 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 A/E, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.7 SURFACE-PREPARATION SCHEDULE

- A. General: Before painting, prepare surfaces for painting according to applicable requirements specified in this schedule.
  1. Examine surfaces to evaluate each surface condition according to paragraphs below.
  2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
  3. Repair substrate defects according to "Substrate Repair" Article.
- B. Surface Preparation for MPI DSD 0 Degree of Surface Degradation:
  1. Surface Condition: Existing paint film in good condition and tightly adhered.
  2. Paint Removal: Not required.

3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.
- C. Surface Preparation for MPI DSD 1 Degree of Surface Degradation:
1. Surface Condition: Paint film cracked or broken but adhered.
  2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.
  3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.

END OF SECTION 090190.52





## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Nonstructural steel framing.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of nonstructural steel framing and fastening and anchorage details.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, and attachments to adjoining work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For code-compliance certification of studs and track.

- B. Evaluation Reports: From ICC-ES showing compliance with Project requirements, for the following:

1. Studs and track.
2. High-strength steel studs and track.
3. Equivalent corrosion-resistant coating on steel framing.
4. Firestop track.
5. Post-installed anchors.
6. Power-actuated fasteners.

#### 1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Track: Provide documentation that framing members are certified in accordance with product-certification program of the Steel Framing Industry Association the Steel Stud Manufacturers Association or the Supreme Steel Framing System Association.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Protect materials from corrosion, deformation, and other damage during delivery, storage, and handling in accordance with AISI S202.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Where indicated on Drawings, provide assemblies incorporating nonstructural steel framing identical to those of assemblies tested for fire resistance in accordance with ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: Where indicated on Drawings, provide assemblies incorporating nonstructural framing identical to those of assemblies tested in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.
- C. Horizontal Deflection: For non-composite wall assemblies, limited to 1/240 and 1/360 at walls to receive tile of the wall height based on the following horizontal loading:
  - 1. Horizontal Loading: 5 lbf/sq. ft.

2.2 NONSTRUCTURAL STEEL FRAMING

- A. Framing Members, General: Comply with requirements in AISI S220 for conditions indicated on Drawings.
  - 1. Protective Coating: ASTM A653/A653M, G40 and ASTM A653/A653M, G60 at walls to receive tile or coating with demonstrated equivalent corrosion resistance. Galvanized products are unacceptable.
    - a. Equivalent Corrosion-Resistant Coating: Evaluation report acceptable to authorities having jurisdiction demonstrates corrosion resistance equivalent to specified protective coating.
- B. High-Strength Steel Studs and Track: Roll-formed into proprietary shapes incorporating ribs, embossment, knurling, or dimensional changes to stiffen framing members.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. Marino\WARE.
    - c. Steel Construction Systems; Stone Group of Companies.
    - d. US Frame Factory.

2. Minimum Base-Steel Thickness and Yield Strength: As required by horizontal deflection performance requirements.
  3. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated on Drawings, provide one of the following:
1. Slotted Deflection Track: Steel sheet top track manufactured with 2-1/2-inch- deep flanges that allow positive attachment to studs through long slots and prevent deflection of structure above from cracking finishes applied to framing; in base-steel thickness not less than that of studs and in width to accommodate depth of studs.
  2. Double-Track System: Top outer track sized to friction-fit over inner track and inner track with 2-inch- deep flanges in base-steel thickness not less than that of studs and fastened to studs.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) ClarkDietrich.
      - 2) SCAFCO Steel Stud Company; Stone Group of Companies.
      - 3) Steel Construction Systems; Stone Group of Companies.
      - 4) US Frame Factory.
- D. Firestop Track: Top track manufactured to allow partition heads to expand and contract with movement of structure above while maintaining continuity of fire-resistance-rated assembly indicated on Drawings; in base-steel thickness not less than that of studs and in width to accommodate depth of studs.

## 2.3 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.
- B. Adjustable Wall-Furring Brackets: ASTM A653/A653M G40 or G60 at tile walls hot-dip galvanized steel sheet in minimum 0.0329-inch- base-steel thickness with serrated edges for attaching furring channels to exterior masonry or concrete walls.
- C. Post-Installed Anchors: Fastener systems with an evaluation report, acceptable to authorities having jurisdiction, based on ICC-ES AC01 AC193 AC58 or AC308 as appropriate for the substrate.
1. Securing Hangers:
    - a. Type: torque-controlled, adhesive anchor or adhesive anchor.
    - b. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated on Drawings.
- D. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, substrates, and conditions, with Installer present, 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 required to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
  1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling track to surfaces indicated on Drawings 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 nonstructural steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated on Drawings. Protect adjacent fire-resistive materials from damage.

#### 3.3 INSTALLATION OF NONSTRUCTURAL METAL FRAMING, GENERAL

- A. Installation Standard: ASTM C754.
  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 framing members. Frame both sides of joints independently.

### 3.4 INSTALLATION OF NONSTRUCTURAL STEEL FRAMING

- A. Install framing system components at spacings indicated on Drawings, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated on Drawings.
  - 2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated on Drawings.
- 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 track at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated on Drawings 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 on Drawings.
    - 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 unless otherwise indicated on Drawings.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated on Drawings. 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 on Drawings and support closures to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Install to maintain continuity of fire-resistance-rated assembly indicated on Drawings.
  - 5. STC-Rated Partitions: Install framing to comply with STC-rated assembly indicated on Drawings.
  - 6. Curved Partitions:

- a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
  - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of at least two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Wall-Furring Bracket Systems: Install brackets with serrated edges facing upward spaced at minimum 48 inches o.c. vertically with 6 inches maximum from floor and ceiling, and minimum 36 inches o.c. horizontally with 4 inches maximum from abutting construction, unless otherwise indicated on Drawings.
- G. 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.
- H. Installation Tolerances for Nonstructural Steel Framing:
1. Framing Members: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for nonstructural steel framing and suspension systems that support gypsum board panels.
2. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Locations and installation of control and expansion joints, including plans, elevations, sections, and attachment details.

#### 1.3 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

- a. Each level of gypsum board finish required for use in exposed locations.
2. Apply or install final decoration required, including painting and wallcoverings, on exposed surfaces for review of mockups.
  3. Simulate finished lighting conditions for review of mockups.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Notify A/E and Owner when gypsum board is completely hung and finish compound is sanded smooth. A/E and Owner shall review gypsum wall board installation before priming and painting. Proceed with coating application only after unsatisfactory conditions have been corrected. This review does not constitute approval of deviations from the Contract Documents unless A/E's specifically approves such deviations in writing.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels 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 SOURCE LIMITATIONS

- A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E119; tested by a qualified testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E90 and classified in accordance with ASTM E413; tested by a qualified testing agency.

2.3 GYPSUM BOARD, GENERAL

- A. Size: Provide panel products in maximum lengths and widths available that will minimize joints in each area and that correspond with support system specified or indicated on Drawings.

2.4 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.



1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. American Gypsum.
  - b. CertainTeed; SAINT-GOBAIN.
  - c. Georgia-Pacific Gypsum LLC.
  - d. Gold Bond Building Products, LLC provided by National Gypsum Company.
  - e. USG Corporation.
2. Thickness: As indicated on Drawings.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Gypsum.
  - b. CertainTeed; SAINT-GOBAIN.
  - c. Georgia-Pacific Gypsum LLC.
  - d. Gold Bond Building Products, LLC provided by National Gypsum Company.
  - e. USG Corporation.
2. Thickness: As indicated on Drawings.
3. Long Edges: Tapered.

## 2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized-steel sheet or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - f. Expansion (control) joint.
  - g. Curved-Edge Cornerbead: With notched or flexible flanges.

## 2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.

- 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 drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

## 2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise specified or indicated on Drawings.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended in writing by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers as follows:
  - 1. Non-Fire-Resistance-Rated Assemblies: Glass or slag or rock wool.
  - 2. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, 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 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840 requirements.
- 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. 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.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. 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.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. 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.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: 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 C919 requirements and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound-attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:

1. Gypsum Wallboard: As indicated on Drawings.
2. Gypsum Board, Type X: As indicated on Drawings.
3. Gypsum Ceiling Board: As indicated on Drawings.

B. 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 on Drawings.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise specified or indicated on Drawings 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.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLICATION OF JOINT TREATMENT MATERIALS

- A. Finishing Panel Products: Treat joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare panel surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over panel joints, except for trim products specifically indicated as not intended to receive tape.
- D. Interior Gypsum Board: Finish panels to levels indicated below and in accordance with ASTM C840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 2: Panels that are substrate for tile.
  3. Level 3: Where indicated on Drawings.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
  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 Section 099123 "Interior Painting."
  5. Level 5: Where indicated on Drawings.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.5 PROTECTION

- A. Protect adjacent surfaces from joint compound and promptly remove from floors and other non-gypsum board surfaces. Repair surfaces stained, marred, or otherwise damaged during gypsum board installation and finishing.
- 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, and 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 092900



## SECTION 093013 - CERAMIC TILING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Ceramic mosaic tile.
2. Glazed wall tile.
3. Tile backing panels.
4. Crack isolation membranes.
5. Setting material.
6. Grout materials.

##### B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of movement joints in tile surfaces.

#### 1.2 DEFINITIONS

- A. General: Definitions in ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. Face Size: Actual tile size, excluding spacer lugs.
- C. Large Format Tile: Tile with at least one edge 15 inches or longer.
- D. Module Size: Actual tile size plus joint width indicated.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations, plans, and elevations, of each type of tile and tile pattern. Show widths, details, and locations of movement joints in tile substrates and finished tile surfaces. Show thresholds.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection or shade variation.

- D. Samples for Verification:
  - 1. Full-size units of each type of trim and accessory for each color and finish required.
  - 2. Metal flooring transitions 6-inch lengths.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product, including product use classification.
- C. Product Test Reports:
  - 1. Tile-setting and -grouting products.
  - 2. Certified porcelain tile.
  - 3. Slip-resistance test reports from qualified independent testing agency.
- D. Field Quality-Control Reports: Water test reports of membrane in wet areas.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
  - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer's supervisor for Project holds the International Masonry Institute's Supervisor Certification.
  - 2. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

#### 1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockup of floor tile installation were indicated on the drawings.
  - 2. Build mockup of wall tile installation were indicated on the drawings.
  - 3. Subject to compliance with requirements, approved mockups may become part of the



completed Work if undisturbed at time of Substantial Completion.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

#### 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard Grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
  - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

## 2.2 CERAMIC MOSAIC TILE

### A. Ceramic Mosaic Tile Type (CT-2): Unglazed.

1. Basis-of-Design Product: Subject to compliance with requirements, provide daltile; keystones or comparable product by one of the following:
  - a. American Olean; a brand of Dal-Tile Corporation
  - b. Crossville, Inc.
  - c. Portobello America, Inc.
2. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
3. Module Size: 2 by 2 inches.
4. Thickness: 1/4 inch.
5. Face: Plain with cushion edges.
6. Surface: Smooth, without abrasive admixture.
7. Product Use Classification: Interior, Wet (IW) Interior, Wet Plus (IW+).
8. Tile Color and Pattern: As indicated on the drawings.
9. Grout Color: As selected by A/E from manufacturer's full range.

## 2.3 GLAZED WALL TILE

### A. Glazed Wall Tile Type (CT-1):

1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Color Wheel Classic or comparable product by one of the following:
  - a. American Olean; a brand of Dal-Tile Corporation
  - b. Crossville, Inc.
  - c. Marazzi USA; a brand of Dal-Tile Corporation
  - d. Vitromex USA, Inc.
2. Module Size: 4-1/4 by 4-1/4 inches.
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch.
5. Tile Color and Pattern: As indicated on the drawings.
6. Grout Color: As selected by A/E from manufacturer's full range.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
  - a. Base for Thinset Mortar Installations: Straight, module size 4-1/4 by 4-1/4 inches.
  - b. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size 4-1/4 by 4-1/4 inches.
  - c. External Corners for Thinset Mortar Installations: Surface bullnose; same size as adjoining flat tile.
  - d. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

## 2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges in maximum lengths available to minimize end-to-end butt joints.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed; SAINT-GOBAIN
    - b. James Hardie Building Products, Inc.
    - c. PermaBASE Building Products, LLC provided by National Gypsum Company
    - d. USG Corporation
  - 2. Thickness: As indicated on Drawings.
  - 3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

## 2.5 WATERPROOF MEMBRANES

- A. General: Manufacturer's standard product, that complies with ANSI A118.10 and ANSI A118.12 and is recommended by manufacturer for application indicated. Include reinforcement and accessories recommended by manufacturer.

## 2.6 CRACK ISOLATION MEMBRANES

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by manufacturer for application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Crack Isolation Membrane, Polyethylene Sheet: Polyethylene faced on both sides with polyester fabric.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Custom Building Products.
    - b. Laticrete International, Inc.
    - c. MAPEI Corporation.
    - d. Noble Company (The).
    - e. Schluter Systems L.P.

## 2.7 GROUT MATERIALS

- A. Standard Cement Grout: ANSI A118.6.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ARDEX Americas.
    - b. Bostik; Arkema

- c. C-Cure
- d. Laticrete International, Inc.
- e. MAPEI Corporation
- f. Parex, a Sika brand
- g. Sika Corporation

B. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

## 2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting and adhesive materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.

C. Metal Flooring Transitions: Profile designed specifically for flooring applications; height to match tile and setting-bed thickness.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Blanke Corporation.
- b. Dural USA, Inc.
- c. Schluter Systems L.P.

2. Description: L-shaped.

3. Material and Finish: Metallic or combination of metal and PVC or neoprene base; polished chrome anodized aluminum exposed-edge material.

D. Metal Edge Trim: Profile designed for wall terminations and edge protection.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Blanke Corporation.
- b. Dural USA, Inc.
- c. Profilitec Corp.
- d. Progress Profiles America Inc.
- e. Schluter Systems L.P.

2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

- a. Blanke Corporation.
- b. Dural USA, Inc.
- c. Profilitec Corp.
- d. Progress Profiles America Inc.
- e. Schluter Systems L.P.

3. Description: L-shaped.
  4. Terminations: End caps matching edge-protection profile.
  5. Material and Finish: Polished chrome anodized aluminum exposed-edge material.
- E. Temporary Protective Coating: Formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products and easily removable after grouting is completed without damaging grout or tile.
- F. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- G. Grout Sealer: Grout manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
  3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with A/E.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove coatings, including curing compounds or other coatings, that are incompatible with tile-setting materials.
- B. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-

setting material manufacturer.

- C. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1 and is sloped 1/4 inch per foot toward drains.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- E. Substrate Flatness:
  - 1. For tile shorter than 15 inches, confirm that structure or substrate is limited to variation of 1/4 inch in 10 ft. from the required plane, and no more than 1/16 inch in 12 inches when measured from tile surface high points.
- F. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### 3.3 INSTALLATION OF CERAMIC TILE SYSTEM

- A. Install tile backing panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.
- B. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
  - 1. Allow crack isolation membrane to cure before installing tile or setting materials over it.
- C. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
  - 1. Add materials, water, and additives in accurate proportions.
  - 2. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.
- D. Install tile in accordance with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 series that are referenced in TCNA installation methods and specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors in wet areas.
  - 2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
  4. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
  5. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
  6. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
    - a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets, so joints between sheets are not apparent in finished Work.
    - b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
    - c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
  7. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- E. Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- F. Thresholds: Install stone and solid surface thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
  2. Do not extend waterproof membrane or crack isolation membrane under thresholds set in modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane with elastomeric sealant.
- G. Metal Flooring Transitions: Install at locations indicated.
- H. Metal Wall Trim: Install at locations indicated on Drawings.
- I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors in accordance with manufacturer's written instructions. As soon as sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

### 3.4 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile in accordance with tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

### 3.5 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
  - 1. TCNA F125-Full: Thinset mortar on crack isolation membrane.
    - a. Ceramic Tile Type: CT-2.
    - b. Thinset Mortar: Modified dry-set mortar.
    - c. Grout: Standard unsanded cement grout.
    - d. Crack Isolation Membrane: As recommended by setting material manufacturer.
    - e. Joint Width: 1/8 inch.
    - f. Movement Joints: Types located on Drawings.
- B. Interior Wall Installations, Masonry or Concrete:
  - 1. TCNA W202I: Thinset mortar
    - a. Ceramic Tile Type: CT-1.
    - b. Thinset Mortar: Modified dry-set mortar.
    - c. Grout: Standard unsanded cement grout.
    - d. Joint Width: 1/16 inch.
    - e. Movement Joints: Types located on Drawings.



- C. Interior Wall Installations, Wood or Metal Studs or Furring:
  - 1. TCNA W245: Thinset mortar on cementitious backer board.
    - a. Ceramic Tile Type: CT-1.
    - b. Thinset Mortar: Modified dry-set mortar.
    - c. Grout: Standard unsanded cement grout.
    - d. Waterproof Membrane: As recommended by setting material manufacturer.
    - e. Joint Width: 1/8 inch.
    - f. Movement Joints: Types located on Drawings.

END OF SECTION 093013



## SECTION 095113 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Acoustical panels.
  2. Metal suspension system.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data:
1. 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.
  2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Ceiling suspension-system members.
  2. Structural members to which suspension systems will be attached.
  3. Method of attaching hangers to building structure.
  4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
  5. Size and location of initial access modules for acoustical panels.
  6. Items penetrating finished ceiling and ceiling-mounted items including the following:
    - a. Lighting fixtures.
    - b. Diffusers.
    - c. Grilles.
    - d. Speakers.
    - e. Sprinklers.

- f. Access panels.
      - g. Perimeter moldings.
    - 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
    - 8. Minimum Drawing Scale: 1/4 inch = 1 foot.
  - B. Qualification Data: For testing agency.
  - C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
  - D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For finishes to include in maintenance manuals.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials, from the same production run, 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.
    - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
- 1.7 QUALITY ASSURANCE
- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
    - 1. Build mockup of typical ceiling area as indicated on Drawings.
    - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
    - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.8 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.

## 1.9 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 SOURCE LIMITATIONS

- A. Source Limitations for Ceiling System: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. 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 in accordance with ASTM E1264.
  - 2. Smoke-Developed Index: 50 or less.

### 2.3 ACOUSTICAL PANELS (ACT-1)

- A. Acoustical Panels:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, Ultima 1941 or comparable product by one of the following:
    - a. American Gypsum
    - b. CertainTeed; SAINT-GOBAIN
    - c. USG Corporation
  - 2. Acoustical Panel Standard: Provide manufacturer's standard panels in accordance with ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
  - 3. Classification: Provide panels as follows:
    - a. Type and Form, Type IV Form 2: Mineral base with membrane-faced overlay; Form 2, water felted; with acoustical transparent membrane.
    - b. Pattern: E (lightly textured).

4. Color: White.
5. Light Reflectance (LR): Not less than 0.85.
6. Ceiling Attenuation Class (CAC): Not less than 35.
7. Noise Reduction Coefficient (NRC): Not less than 0.80.
8. Edge/Joint Detail: As indicated by manufacturer's designation.
9. Thickness: 1 inch.
10. Modular Size: As indicated on Drawings.
11. 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 in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

## 2.4 ACOUSTICAL PANELS (ACT-2)

### A. Acoustical Panels:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, Clean Room VL Unperforated or comparable product by one of the following:
  - a. American Gypsum
  - b. CertainTeed; SAINT-GOBAIN
  - c. USG Corporation
2. Acoustical Panel Standard: Provide manufacturer's standard panels in accordance with ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
3. Classification
  - a. Type and Form, Type IV Form 2: Mineral base with membrane-faced overlay; Form 2, water felted with vinyl overlay on face, back, and sealed edges.
  - b. Pattern: E (lightly textured).
4. Color: White.
5. Light Reflectance (LR): Not less than 0.80.
6. Ceiling Attenuation Class (CAC): Not less than 40.
7. Edge/Joint Detail: Square.
8. Thickness: 1-inch.
9. Modular Size: As indicated on the drawings.
10. 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 in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21

## 2.5 METAL SUSPENSION SYSTEM

### A. Exposed Metal Suspension System:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong Ceiling & Wall Solutions.
  - b. Armstrong World Industries.
  - c. CertainTeed; SAINT-GOBAIN.
  - d. USG Corporation.
2. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories in accordance with ASTM C635/C635M and designated by type, structural classification, and finish indicated.
  - a. High-Humidity Finish:(ACT-2) and where indicated, provide coating tested and classified for "severe environment performance" in accordance with ASTM C635/C635M.
3. Wide-Face, Capped, Double-Web, Steel Suspension System (ACT-1): Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.
  - a. Structural Classification: Intermediate-duty system.
  - b. End Condition of Cross Runners: butt-edge type.
  - c. Face Design: Flat, flush.
  - d. Cap Material: Cold-rolled steel.
  - e. Cap Finish: Painted white.
4. Wide-Face, Aluminum-Capped, Double-Web, Hot-Dip Galvanized, G60 (Z180), Steel Suspension System (ACT-2): Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized, G60 coating designation; with prefinished, 15/16-inch- wide aluminum caps on flanges.
  - a. Structural Classification: Intermediate-duty system.
  - b. Face Design: Flat, flush.
  - c. Cap Finish: Painted white.

## 2.6 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.
- 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. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

## 2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical 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 OF ACOUSTICAL PANEL CEILINGS

- A. Install acoustical panel ceilings in accordance with ASTM C636/C636M and manufacturer's written instructions.
- 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 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. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  6. 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.
  7. Do not attach hangers to steel deck tabs.
  8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  9. 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.
  10. 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. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
  5. 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.

6. Protect lighting fixtures and air ducts in accordance with 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.

#### 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 095113

## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Vinyl base.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

#### 1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

#### 1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Coordinate mockups in this Section with mockups specified in other Sections.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
  3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

## 1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 VINYL BASE (RUB-X)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Roppe or comparable product by one of the following:
  - 1. Flexco Corporation.
  - 2. Johnsonite; a Tarkett company.
- B. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).
  - 1. Group: II (layered).
  - 2. Style and Location:
    - a. Style A, Straight: Provide in areas with carpet.
    - b. Style B, Cove: Provide in areas with resilient floor coverings.
- C. Minimum Thickness: 0.125 inch.
- D. Height: As indicated on Drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors and Patterns: As indicated on the drawings.

### 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or

blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

### 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.
  - 1. 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 resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. 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.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Miter or cope corners to minimize open joints.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513





## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Vinyl composition floor tile.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples for Initial Selection: For each type of floor tile indicated.
- D. Samples for Verification: Full-size units of each color and pattern of floor tile required.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Coordinate mockups in this Section with mockups specified in other Sections.
    - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations indicated.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
  3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

#### 1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
1. 48 hours before installation.
  2. During installation.
  3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

## 2.2 VINYL COMPOSITION FLOOR TILE (VCT-X)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Standard Excelon or comparable product by one of the following:
  - 1. Johnsonite; a Tarkett company
  - 2. Tarkett USA
- B. Tile Standard: ASTM F1066, Class 2, through pattern.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As indicated on the drawings.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## 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.
  - 1. 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 tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

- B. Concrete Substrates: Prepare according to ASTM F710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

#### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply three coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519



## SECTION 096813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Carpet tile.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

#### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
  - a. Review delivery, storage, and handling procedures.
  - b. Review ambient conditions and ventilation procedures.
  - c. Review subfloor preparation procedures.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.

10. Transition details to other flooring materials.
  - C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of carpet tile.
    1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
  - D. Samples for Verification: Actual sample of finished products for each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
    1. Carpet Tile: Full-size Sample.
    2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
  - E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
  - B. Qualification Statements: For Installer.
  - C. Sample Warranties: For carpet tile.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For carpet tiles. 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.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
- A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner 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 no fewer than 10 full-size units.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An authorized representative who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.



## 1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
  - 1. Build mockups as indicated on Drawings.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

## 1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or 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 levels planned for building occupants during the remainder of the construction period.
- 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 in writing 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.

## 1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: 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 loss of face fiber, edge raveling, snags, and runs.
    - b. Loss of tuft-bind strength.
    - c. Excess static discharge.
    - d. Delamination.
    - e. Dimensional instability.
  - 3. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Interface, Diddley Dot or comparable product by one of the following:
  - 1. J&J Flooring Group LLC
  - 2. Mannington Commercial; a business unit of Mannington Mills, Inc.
  - 3. Shaw Industries Group, Inc.; Berkshire Hathaway Company
- B. Color:
- C. Pattern:
- D. Fiber Content: 100 percent nylon 6.
- E. Pile Characteristic: pile.
- F. Density: 7.2 oz./cu. yd.
- G. Stitches: 9 per inch.
- H. Gage: 1/12 per inch.
- I. Surface Pile Weight: 20 oz./sq. yd.
- J. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- K. Size: 24 by 24 inches.
- L. Applied Treatments:
  - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
  - 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles 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, and no fungal growth, in accordance with AATCC 174.
- M. Performance Characteristics:
  - 1. Texture Appearance Retention Rating (TARR): Severe traffic, 3.5 minimum in accordance with ASTM D7330.
  - 2. Critical Radiant Flux Classification: Not less than 0.22 W/sq. cm in accordance with NFPA 253 or ASTM E-648.
  - 3. Flammability: Pass Methenamine Pill Test (DOC-FF1-70) or with ASTM D2859.
  - 4. Dry Breaking Strength: Not less than 100 lbf in accordance with ASTM D2646.
  - 5. Delamination: Not less than 3.5 lbf/in. in accordance with ASTM D3936.
  - 6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by

- physical measurement.
7. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) in accordance with AATCC 16.3 Option 3.
  8. Electrostatic Propensity: Less than kV in accordance with AATCC 134.

## 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended in writing by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive types to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and that are recommended in writing by carpet tile manufacturer for releasable installation.
  1. Adhesives shall have a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

- D. Access Flooring Systems: Verify the following:
  - 1. Access floor substrate is compatible with carpet tile and adhesive if any.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, in accordance with manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. 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 in writing by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

- I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

#### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended in writing 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 CRI 104, Section 13.7.
- 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 096813



## SECTION 099124 - INTERIOR PAINTING (MPI STANDARDS)

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Concrete masonry units (CMUs).
  - 2. Steel and iron.
  - 3. Gypsum board.
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
  - 2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
  - 3. Section 055113 "Metal Pan Stairs" for shop priming metal pan stairs.
  - 4. Section 055119 "Metal Grating Stairs" for shop priming metal grating stairs.
  - 5. Section 055213 "Pipe and Tube Railings" for shop priming pipe and tube railings.

#### 1.2 DEFINITIONS

- A. MPI Gloss Level 1: (P-XA) Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 3: (P-XB) 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 5: (P-XC) 35 to 70 units at 60 degrees, according to ASTM D523.
- D. MPI Gloss Level 6: (P-XD) 70 to 85 units at 60 degrees, according to ASTM D523.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.

2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. A/E will select one surface to represent surfaces and conditions for application of each paint system.
  - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
  - b. Other Items: A/E will designate items or areas required.
2. Final approval of color selections will be based on mockups.
  - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by A/E at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless A/E specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 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.

#### 1.7 FIELD 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 of less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 PAINT, GENERAL

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Behr Paint Company (Behr Process LLC)
  - 2. Benjamin Moore & Co.
  - 3. PPG Paints; PPG Industries, Inc.
  - 4. Pratt & Lambert; a subsidiary of The Sherwin-Williams Company
  - 5. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
  - 6. Sherwin-Williams Company (The)
- B. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- C. Material Compatibility:
  - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- D. Colors: Match A/E's samples as indicated in the drawings.
  - 1. Ten percent of surface area will be painted with deep tones.

## 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 the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Fiber-Cement Board: 12 percent.
  - 3. Masonry (Clay and CMUs): 12 percent.
  - 4. Wood: 15 percent.

5. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat 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.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  1. SSPC-SP 2.
  2. SSPC-SP 3.
  3. SSPC-SP 7/NACE No. 4.
  4. SSPC-SP 11.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

### 3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 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. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
  
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
  
- D. 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.
  
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  
  - 2. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering

- h. Other items as directed by A/E.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### 3.4 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 A/E, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.5 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
  - 1. Latex System, MPI INT 4.2A:
    - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat:
      - 1) Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
      - 2) Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.
- B. Steel Substrates:
  - 1. Latex System, Alkyd Primer, MPI INT 5.1Q:
    - a. Prime Coat:
      - 1) Primer, alkyd, quick dry, for metal, MPI #76.
      - 2) Shop primer specified in Section where substrate is specified.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat:
      - 1) Latex, interior, flat (MPI Gloss Level 1), MPI #53.
      - 2) Latex, interior (MPI Gloss Level 3), MPI #52.
      - 3) Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.

- 4) Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.
2. Water-Based Dry-Fall System, MPI INT 5.1C:
    - a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
    - b. Prime Coat: Shop primer specified in Section where substrate is specified.
    - c. Topcoat: Dry fall, latex, flat, MPI #118.
- C. Gypsum Board and Plaster Substrates:
1. Latex over Latex Sealer System, MPI INT 9.2A:
    - a. Prime Coat:
      - 1) Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat:
      - 1) Latex, interior, flat (MPI Gloss Level 1), MPI #53.
      - 2) Latex, interior (MPI Gloss Level 3), MPI #52.
      - 3) Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
      - 4) Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

END OF SECTION 099124



## SECTION 101100 - VISUAL DISPLAY UNITS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Visual display board assemblies.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Visual display board assemblies.
- B. Product Data Submittals: For each product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- C. Shop Drawings: For visual display units.
  - 1. Include plans, elevations, sections, details, and attachment to other work.
  - 2. Include sections of typical trim members.
- D. Product Schedule: For visual display units. Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each visual display unit, for tests performed by a qualified testing agency.
- C. Sample Warranties: For manufacturer's special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Surfaces lose original writing and erasing qualities.
    - b. Surfaces exhibit crazing, cracking, or flaking.
  - 2. Warranty Period:
    - a. Life of the building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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: 25 or less.
  - 2. Smoke-Developed Index: 50 or less.

2.2 VISUAL DISPLAY BOARD ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the



following:

1. Claridge Products and Equipment, LLC.
  2. ghent; a GMi Company
  3. PolyVision Corporation
- B. Visual Display Board Assembly: factory fabricated.
1. Assembly: markerboard.
  2. Corners: Square.
  3. Width: As indicated on Drawings.
  4. Height: As indicated on Drawings.
  5. Mounting Method: Direct to wall.
- C. Markerboard Panel: Porcelain-enamel-faced markerboard panel on core indicated.
1. Color: White.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; standard size and shape.
1. Aluminum Finish: Clear anodic finish.
- E. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
- F. Combination Assemblies: Provide hidden spline between abutting sections of visual display panels.
- G. Chalktray: Manufacturer's standard; continuous.
1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

## 2.3 MARKERBOARD PANELS

- A. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with low-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
1. Face Sheet Thickness: 0.021 inch uncoated base metal thickness.
  2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
  3. Particleboard Core: 1/2 inch thick; with 0.005-inch- thick, aluminum foil backing.
  4. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
- B. High-Pressure Markerboard Laminate Panels: Factory-laminated markerboard panel of three-ply construction, consisting of backing, fiberboard core material, and high-pressure markerboard laminate writing surface.

## 2.4 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish; with surface-burning characteristics indicated.
- C. Hardboard: ANSI A135.4, tempered.
- D. Particleboard: ANSI A208.1, Grade M-1.
- E. Extruded Aluminum: ASTM B221, Alloy 6063.
- F. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.
- G. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Section 099123 "Interior Painting" and recommended in writing by visual display unit manufacturer for intended substrate.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA AMP 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.

- C. Examine walls and partitions for proper preparation and backing for visual display units.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive visual display units and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.
- E. Prepare recesses for sliding visual display units as required by type and size of unit.

### 3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Factory-Fabricated Visual Display Board Assemblies:
  - 1. Adhere to wall surfaces with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
- C. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated below.
  - 1. Mounting Height: 36 inches above finished floor to top of chalktray.

### 3.4 CLEANING AND PROTECTION

- A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

## SECTION 102123 - CUBICLE CURTAINS AND TRACK

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Cubicle-curtain support systems.
2. Cubicle curtains.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for supplementary wood framing and blocking for mounting items requiring anchorage.
2. Section 092216 "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.

#### 1.2 ACTION SUBMITTALS

A. Product Data:

1. Cubicle-curtain support systems.
2. Cubicle curtains.

B. Product Data Submittals: For each product.

1. For each type of curtain fabric indicated, include durability, laundry temperature limits, fade resistance, applied curtain treatments, and fire-test-response characteristics.

C. Shop Drawings: For curtains and tracks.

1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
2. Include details of blocking for track support.

D. Samples for Initial Selection: For each type of curtain material indicated.

E. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Curtain Fabric: Not less than 10 inches square and showing complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
2. Mesh Top: Not less than 10 inches square.
3. Curtain Track: Not less than 10 inches long.
4. Curtain Carrier: Full-size unit.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For curtains, tracks, and hardware to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Cubicle Curtains: Provide curtain fabrics with the following characteristics:
  - 1. Laundering: Launderable to a water temperature of not less than 160 deg F.
  - 2. Flame Resistance: Provide fabrics identical to those that have passed NFPA 701 when tested by a qualified testing agency acceptable to authorities having jurisdiction.
    - a. Identify fabrics with appropriate markings of a qualified testing agency.

### 2.2 CUBICLE-CURTAIN SUPPORT SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide CS Cubicle Curtains; A division of Construction Specialties, Inc or comparable product by one of the following:
  - 1. Construction Specialties, Inc.
  - 2. Healthcare Curtains
  - 3. inpro Corporation
- B. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high.
  - 1. Track Minimum Wall Thickness: Manufacturer's standard.
  - 2. Curved Track: Factory-fabricated, 12-inch- radius bends.
  - 3. Finish: Clear anodized.
- C. Curtain-Track Mounting: Surface.
- D. Curtain-Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
  - 1. End Stop: Removable with carrier hook.
- E. Curtain Roller Carriers: Two nylon rollers and nylon axle with nylon hook.
- F. Curtain Glide Carriers: One-piece nylon glide with nylon hook.
- G. Breakaway Curtain Carriers: One-piece nylon breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than 5 lbf.
- H. Exposed Fasteners: Stainless steel.

- I. Concealed Fasteners: Stainless steel.

## 2.3 CUBICLE CURTAINS

- A. Fabric: Curtain manufacturer's standard, vinyl; inherently and permanently flame resistant, stain resistant, and antimicrobial.
  - 1. Pattern: As selected by A/E from manufacturer's full range.
  - 2. Width: As indicated on the drawings.
  - 3. Color: As selected by A/E from manufacturer's full range.
- B. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.
- C. Mesh Top: Not less than 22-inch- high mesh top.
  - 1. Mesh: No. 40 nylon mesh.

## 2.4 CURTAIN FABRICATION

- A. Continuous Curtain Panels:
  - 1. Width: Equal to track length from which curtain is hung plus 10 percent of added fullness, but not less than 12 inches of added fullness.
  - 2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor of 12 inches.
  - 3. Top Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lockstitched.
  - 4. Mesh Top: Top hem of mesh not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lockstitched. Double lockstitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.
  - 5. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced, and double lockstitched.
  - 6. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lockstitched.
  - 7. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install tracks level and plumb, according to manufacturer's written instructions.
- B. For tracks of up to 20 feet in length, provide track fabricated from single, continuous length.
  - 1. Curtain-Track Mounting: As indicated on Drawings.
- C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
  - 1. Mechanically fasten directly to bottom of concrete deck with post-installed anchors.
  - 2. Mechanically fasten directly to finished ceiling with toggle bolts.
  - 3. Mechanically fasten to furring through suspended ceiling with screw and tube spacer.
  - 4. Mechanically fasten to suspended ceiling grid with screws.
  - 5. Attach track to suspended ceiling grid with manufacturer's proprietary clip.
- D. Suspended-Track Mounting: Install track with manufacturer's standard tubular aluminum suspended supports at intervals and with fasteners recommended by manufacturer. Fasten supports to structure. Provide supports at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.
- E. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
  - 1. Provide one locking switch unit for each pair of beds.
- F. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.
- G. Cubicle Curtains: Hang curtains on each curtain track.

END OF SECTION 102123



## SECTION 102600 - WALL AND DOOR PROTECTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Corner guards.

#### 1.2 ACTION 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.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.

C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Corner Guards: 12 inches long. Include example top caps.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of handrail.

B. Material Certificates: For each type of exposed plastic material.

C. Sample Warranty: For special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. 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.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch-long units.
  - 2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

## 1.6 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 wall- and door-protection components 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.

## 1.7 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 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 ICC A117.1.

## 2.2 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard, PVC-free assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. inpro Corporation
    - b. JL Industries; Activar Construction Products Group, Inc.
    - c. Koroseal Interior Products, LLC
    - d. Pawling Corporation
  - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
    - a. Profile: Nominal 2-inch- long leg and 1/4-inch corner radius.
    - b. Height: As indicated on the drawings.
    - c. Color and Texture: As indicated on the drawings.
  - 3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
  - 4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

## 2.3 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.

## 2.4 FABRICATION

- A. Fabricate wall and door 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.

## 2.5 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 and door 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 and door 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.

### 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 102600

## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
- B. Owner-Furnished Material: Wall mounted soap dispensers.

#### 1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

### PART 2 - PRODUCTS

#### 2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Paper Towel (Roll) Dispenser:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bobrick Washroom Equipment, Inc or comparable product by one of the following:
    - a. ASI-American Specialties, Inc.

b. Bradley Corporation

2. Description: Pull-towel-actuated mechanism that permits controlled delivery of paper rolls in preset lengths.
3. Mounting: Surface mounted.
4. Minimum Capacity: 8-inch- wide, 800-foot- long roll.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Tumbler type.

## 2.2 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

## 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF TOILET, BATH, AND LAUNDRY ACCESSORIES

- A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  1. Remove temporary labels and protective coatings.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

- B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 102800





## SECTION 104416 - FIRE EXTINGUISHERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
    - b. Faulty operation of valves or release levers.
  - 2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

### 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers (FE/FEC): Type, size, and capacity for each mounting bracket indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Babcock-Davis
    - b. Badger Fire Protection; a Carrier company
    - c. Buckeye Fire Equipment Company
    - d. Guardian Fire Equipment, Inc
    - e. JL Industries; Activar Construction Products Group, Inc.
    - f. Kidde; Carrier Global Corporation
    - g. Larsen's Manufacturing Company
  - 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
  - 3. Valves: Manufacturer's standard.
  - 4. Handles and Levers: Manufacturer's standard.
  - 5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix.
- B. Multipurpose Dry-Chemical Type in Steel Container FE-1: UL-rated 3-A:40-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

### 2.3 MOUNTING BRACKETS

- A. Mounting Brackets (FE): Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
  - 1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by A/E.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
  - a. Orientation: Horizontal.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
  1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION 104416



## SECTION 105613 - METAL STORAGE SHELVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Four-post metal storage shelving.

#### 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.

B. Shop Drawings: For metal storage shelving.

1. Include plans, elevations, sections, and attachment details.
2. Include installation details of connectors, lateral bracing, and special bracing.

C. Product Schedule: For metal storage shelving.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of metal storage shelving.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal storage shelving to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

## PART 2 - PRODUCTS

### 2.1 FOUR-POST METAL STORAGE SHELVING

- A. Four-Post Metal Storage Shelving: Complying with MH 28.1 and field assembled from factory-formed components. Shelves span between supporting corner posts that allow shelf-height adjustment over full height of shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Grainger or comparable product by one of the following:
    - a. Durham Manufacturing Company (The)
    - b. Lyon LLC
    - c. Schaefer Systems International, Inc
    - d. Spacesaver Corporation
  2. Load-Carrying Capacity per Shelf: 700 lb.
  3. Posts: Fabricated from hot-rolled steel; in manufacturer's standard shape; with perforations at 1-1/2 inches o.c. to receive shelf-to-post connectors.
    - a. Unit Configuration: Configure shelving units as individual, freestanding assemblies.
      - 1) Add-On Shelf Posts: Fabricated from hot-rolled steel, manufacturer's standard shape; perforated to match main posts.
    - b. Post Base: Bolt leveler.
  4. Bracing: Manufacturer's standard, single or double diagonal cross bracing.
    - a. Location: At unit back as required for stability, load-carrying capacity of shelves, and number of shelves indicated.
  5. Back Panel: One piece fabricated from cold-rolled steel sheet.
    - a. Steel Sheet Thickness, Nominal: As required for load-carrying capacity per shelf.
  6. End Panels: Fabricated from cold-rolled steel sheet.
    - a. Steel Sheet Thickness, Nominal: As required for load-carrying capacity per shelf.
  7. Framed-Type Wire Shelves: Steel wire; with shelf frame fabricated from same material

- and with same finish as posts.
8. Truss-Type Wire Shelves: Manufacturer's standard, chrome-plated wire-over-wire construction, with downturned wire truss edges.
  9. Shelf Quantity: As indicated on the drawings shelves per shelving unit in addition to top and bottom shelf.
  10. Shelf-to-Post Connectors: Manufacturer's standard connectors.
  11. Base: Open, with exposed post legs.
  12. Overall Unit Width: As indicated on the drawings, inclusive of two end posts.
  13. Overall Unit Depth: As indicated on the drawings.
  14. Overall Unit Height: As indicated on the drawings.
  15. Accessories:
    - a. Bins: Fabricated from same material and with same finish as shelves; size as indicated on Drawings.
    - b. Shelf-Label Holders: Clear plastic, designed to clip onto front edge of shelf.
  16. Steel Finish:
    - a. Color and Gloss: As selected by A/E from manufacturer's full range.

## 2.2 FABRICATION

- A. Fabricate metal storage shelving components to provide field-assembled units that are square and rigid, with posts plumb and true and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping.
  1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
  2. Build in straps, plates, brackets, and other reinforcements as needed to support shelf loading.
  3. Cut, reinforce, drill, and tap metal fabrications to receive hardware, fasteners, and similar items.
- B. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- C. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a hem on the concealed side; ease edges of metal plate to radius of approximately 1/32 inch. Shear and punch metals cleanly and accurately. Remove burrs.
- D. Weld corners and seams continuously to develop strength, minimize distortion, and maintain the corrosion resistance of base metals. At exposed locations, finish welds and surfaces smooth and blended so surface is smooth after finishing and contour of welded surface matches that of adjacent surface. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces before finishing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.
1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
  2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
  3. Adjust post-base bolt leveler to achieve level and plumb installation.
  4. Anchor shelving units to floor with floor anchors through floor plate. Shim floor plate to achieve level and plumb installation.
  5. Connect side-to-side and back-to-back shelving units together.
  6. Install shelves in each shelving unit at spacing indicated on Drawings.
    - a. Four-Post Metal Storage Shelving: Install four clips, one at each post, for support of each shelf; with clips fully engaged in post perforations.
- B. Accessories:
1. Install finished end panels and trim at exposed ends of shelving units.
  2. Shelf Dividers: Install at locations indicated on Drawings.
  3. Bins: Install at locations indicated on Drawings.
  4. Shelf-Label Holders: Install on each shelf.
    - a. Install at locations indicated on Drawings within each shelving unit.
  5. Record Box Support Rails: Provide two for each record storage box.
  6. Shelf Inlays: Install at locations indicated on Drawings.
  7. Storage Baskets: Install at locations indicated on Drawings.
  8. Back Ledges: Install at locations indicated on Drawings.
  9. Side Ledges: Install at locations indicated on Drawings.

### 3.2 ERECTION TOLERANCES

- A. Erect four-post metal storage shelving to a maximum tolerance from vertical of 1/2 inch in up to 10 ft. of height, not exceeding 1 inch for heights taller than 10 ft.
- B. Erect post-and-beam metal storage shelving to a maximum tolerance from vertical of 1/4 inch in 84 inches of height.

END OF SECTION 105613



## SECTION 123661 - SIMULATED STONE COUNTERTOPS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of countertop material and sink.

B. Shop Drawings:

1. Plans, sections, details, edge and backsplash profiles, and attachment to other work.
2. Locations and details of joints.
3. Locations, quantity, and type of supports/brackets.
4. Direction of directional pattern, if any.
5. Locations and sizes of cutouts and holes for items installed in countertop.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification:

1. Countertop material, 6 inches square.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Indicate locations and sizes of cutouts and holes for items installed in countertops or backsplashes.

B. Qualification Statements: For fabricator.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include product data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

#### 1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-

service performance.

- B. Installer Qualifications: Fabricator of countertops.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

#### 1.7 FIELD CONDITIONS

- A. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Quality Standard: Unless otherwise indicated, comply with ANSI/AWI 1236 for grades of simulated stone countertops indicated for construction, finishes, installation, and other requirements.
  - 1. The Contract Documents contain more stringent requirements than that of the referenced quality standard. Comply with requirements of the Contract Documents in addition to those of referenced quality standard.

#### 2.2 SOLID SURFACE MATERIAL COUNTERTOPS

- A. Solid Surface Countertop Type (SS-X):
  - 1. Grade: Premium.
- B. Solid Surface Material (SS-X): Homogeneous fabrication of mineral fillers and pigments bound together with a matrix of polymers and resins, complying with ISFA 2-01.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Avonite Surfaces; a Brand of Aristech Surfaces LLC
    - b. DuPont; DuPont de Nemours, Inc.

- c. Formica Corporation
  - d. Wilsonart LLC
2. Colors and Patterns: As indicated by manufacturer's designations.
3. Countertop:
- a. Type: Standard.
  - b. Thickness:
    - 1) 3/4-inch- thick, solid surface material with front edge built up with same material.
  - c. Exposed Edge Treatment: Bevel.
  - d. Backsplash: Detached straight.
    - 1) Height: 4 inches.
    - 2) Thickness: 1/2 inch.
  - e. End Splash: Matching backsplash.

## 2.3 FABRICATION

- A. Fabricate countertops in sizes and shapes required to comply with requirements indicated.
- B. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
  - 1. Fabricate with loose backsplashes for field assembly.
- C. Joints:
  - 1. Fabricate countertops without joints.
- D. Cutouts and Holes:
  - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
    - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
    - b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
    - c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
  - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
  - 3. Fittings: Drill countertops in shop for grommets, plumbing fittings, undercounter soap dispensers, and similar items.

## 2.4 INSTALLATION MATERIALS

- A. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- C. Adhesive: Product recommended by manufacturer.
- D. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to receive countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Examine shop-fabricated work for completion and complete work as required, including removal of packing.

### 3.3 INSTALLATION OF SIMULATED STONE COUNTERTOPS

- A. Grade: Install countertops to comply with specified grade.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
  - 1. Provide cutouts not finished in the shop. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- C. Countertop Installation:
  - 1. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 3. Anchor wall cleating necessary for proper setting for countertops not supported by

casework.

4. Install countertops level to a tolerance of 1/8 inch in 8 ft., 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
5. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
6. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
7. Secure countertops to subtops with adhesive according to manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
8. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
  - a. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
  - b. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
9. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
10. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
11. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls. Comply with Section 079200 "Joint Sealants."

### 3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semi-exposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123661



## 21 05 01 BASIC FIRE SUPPRESSION REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 Special Note

- A. All provisions of the Bidding Requirements, General Conditions, and Supplementary Conditions, including Divisions 00 and 01, apply to work specified in this Division.
- B. Understanding that the contractors for various Divisions are sub-contractors to the Prime Contractor, assignments of work by division are not intended to restrict the Prime Contractor in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.

#### 1.2 Permits and Regulations

- A. Include payment of all permit and inspection fees applicable to the work in Division 21. Furnish for the Owner certificates of approval from the governing inspection agencies, as a condition for final payment.
- B. Work must conform to applicable local, state and federal laws, ordinances and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. Install no work contrary to minimum legal standards.

#### 1.3 Inspection of Site

- A. Each bidder shall inspect the premises of the existing building. Conditions shall be compared with information shown on the drawings. Report immediately to the Architect any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

#### 1.4 Drawings and Specifications

- A. The contractor shall refer to the architectural drawings for areas of scope and division of work between the two separate projects indicated. Contractors shall provide separate bid numbers for work associated with the Chemistry/Biology spaces and Allied Health spaces as indicated on the architectural drawings and specifications. Refer to description of work in the front end specifications for further information.
- B. The drawings indicate the general arrangement of the work and are to be followed insofar as possible. The word "provide", as used, shall mean "furnish and install". If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Architect for approval before proceeding with the work.
- C. Make all necessary field measurements to ensure correct fitting. Coordinate work with all other trades in such a manner as to cause a minimum of conflict or delay.
- D. The drawings and specifications shall be carefully studied during the course of bidding and construction. Any errors, omissions or discrepancies encountered shall be referred immediately to the Architect for interpretation or correction, so that misunderstandings at a later date may be avoided. The contract drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Having pipe and fittings

fabricated and delivered in advance of making actual measurements shall not be sufficient cause to avoid making offsets and minor changes as may be necessary to install piping and equipment.

- E. The Architect shall reserve the right to make minor adjustment in locations of system runs and components where considered desirable in the interest of concealing work or presenting a better appearance where exposed. Any such changes shall be anticipated and requested sufficiently in advance as to not cause extra work, or unduly delay the work. Coordinate work in advance with all other trades and report immediately any difficulties which can be anticipated.
- F. Equipment or piping shall not be installed in the dedicated electrical space above or in the working space required around electrical switchgear, motor control centers or panelboards as identified by the National Electric Code (NEC).
- G. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict. The Architect's decision shall be final in regard to the arrangement of equipment, piping, etc., where conflict arises.
- H. Provide offsets in system runs, additional fittings and necessary drains required to complete the installation, or for the proper operation of the system. Exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- I. Should overlap of work among the trades become evident, this shall be called to the attention of the Architect. In such event, none of the trades or their suppliers shall assume that they are relieved of the work which is specified under their branch until instructions in writing are received from the Architect.

#### 1.5 Coordination Drawings

- A. The Division 23 Contractor shall prepare and be responsible for 0.25inch scale electronic coordination drawings. These drawings shall be produced using a computer aided drafting software of a mutually agreed upon format with the Division 21, 22, 23, 26, 27 and 28 Contractors. Each Contractor shall prepare their own electronic drawings, using common backgrounds obtained from the Architect and Structural Engineer. The Division 23 Contractor shall be responsible for consolidating (merging) the drawings into combined coordination drawings, and lead the conflict resolution process, with all contractors working together to obtain finished coordinated drawings. No work shall be installed until all contractors have approved and signed-off with their approval and drawings have been submitted and reviewed by the Engineer.
- B. Review by the Engineer is cursory. It is the Contractors responsibilities to ensure that all work is coordinated, including fit above ceilings and that specified ceiling heights are maintained.

#### 1.6 Inspection

- A. All work shall be subject to inspection of Federal, State and local agencies as may be appropriate, and of the Architect and Engineer.
- B. Obtain final inspection certificates and turn over to the Owner.

#### 1.7 Record Drawings



- A. Maintain a separate set of field prints of the contract documents and hand mark all changes or variations, in a manner to be clearly discernible, which are made during construction and the coordination process. Upon completion of the work, and within 90 days of system acceptance, these drawings shall be turned over to the Architect. This shall apply particularly to underground and concealed work, and to other systems where the installation varies to a degree which would justify recording the change.

#### 1.8 Operating and Maintenance Manuals

- A. Assemble three copies of operating and maintenance manuals for the Fire Suppression work.
- B. All "approved" shop drawings and installation, maintenance and operating instruction pamphlets or brochures, wiring diagrams, parts list and other information, along with warranties, shall be obtained from each manufacturer of the principal items of equipment. In addition, prepare and include a chart listing all items of equipment which are furnished under this contract, indicating the nature of maintenance required, the recommended frequency of checking these points and the type of lubricating media or replacement material required. Name and address of a qualified service agency. A complete narrative of how each system is intended to operate.
- C. Pipe pressure test reports shall also be included.
- D. These shall be assembled into three-ring loose leaf binders or other appropriate binding. An index and tabbed sheets to separate the sections shall be included. These shall be submitted to the Engineer for review. Upon approval, manuals shall be turned over to the Owner.

#### 1.9 Final Inspection and Punch List

- A. As the time of work completion approaches, survey and inspect the work and develop their own punch list to confirm that it is complete and finished. Then notify the Architect and request that a final inspection be made. It shall not be considered the Architect's or Engineer's obligation to perform a final inspection until the Contractor has inspected the work and so states at the time of the request for the final inspection.
- B. Requests to the Architect or Engineer for final inspection may be accompanied by a limited list of known deficiencies in completion, with appropriate explanation and schedule for completing these; this is in the interest of expediting acceptance for beneficial occupancy.
- C. The Architect and/or Engineer will inspect the work and prepare a punch list of items requiring correction, completion or verification. Corrective action shall be taken by the Contractor to the satisfaction of Architect and Engineer within 30 days of receipt of the Architect/Engineer's punch list.

#### 1.10 Warranty

- A. Warrant all workmanship, equipment and material entering into this contract for a period of one (1) year from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during this warranty period shall be made good by this Contractor without expense to the Owner. Use of equipment for temporary system use is not the start of the warranty period.
- B. This provision is intended specifically to cover deficiencies in contract completion or performance which are not immediately discovered after systems are placed in operation. Also included shall be supplementary assistance in balancing, adjusting or providing operating

instructions as the need develops, and replacing overload heater elements in starters where necessary to keep systems in operation. Heater element sizes shall not exceed the motor manufacturer's recommendations.

- C. This provision shall not be construed to include maintenance items such as re-tightening or repacking glands, greasing, oiling and cleaning strainers after these have been done for final close-out.
- D. Provisions of this warranty shall be considered supplementary to warranty provisions under Division 01 - General Conditions.

1.11 Project Close-Out

- A. The following schedule summarizes actions to be taken or submittals to be completed prior to issuance of the Contract Completion Certificates. Refer to Division 01 - General Requirements, and applicable paragraphs of this Section and the applicable trade Divisions for additional requirements. This information should be submitted at least thirty days in advance of request for final inspection. Where possible, the information shall be bound in 8.50 inches x 11 inches hard back binders.

ITEM	SPEC SECTION
1. Materials/Suppliers List	21 05 01
2. Record Drawings	21 05 01
3. Certificate of Inspection	21 05 01
4. Tests and Adjustments	21 05 01
5. Operating Instructions and Maintenance Manuals	21 05 01
6. Equipment and Piping Identification	21 05 53
7. Completed Punch List	21 05 01
8. Waiver of Liens	Div. 01
9. Affidavit of Wage Compliance	Div. 01
10. Change Orders and Allowance Adjustment	Div. 01

**PART 2 - PRODUCTS**

2.1 Materials and Equipment

- A. Materials and equipment furnished under this contract shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.

2.2 Listing and Labeling

- A. All equipment and appliances shall be listed and labeled in accordance with the Building and Fire Codes. Testing shall be performed by an Approved Agency, with the seal or mark of the Agency affixed to each piece of equipment or appliance.

2.3 Reference Standards

- A. Where standards (NFPA, NEC, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the authority having jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

## 2.4 Equipment Selection

- A. The selection of materials and equipment to be furnished shall be governed by the following:
  - 1. Where trade names, brands, or manufacturers of equipment or materials are listed in the specification, the exact equipment listed shall be furnished. Where more than one name is used, the Contractor shall have the option of selecting between any one of the several specified. All products shall be first quality line of manufacturers listed.
  - 2. Where the words "or approved equal" appear after a manufacturer's name, specific approval must be obtained from the Architect during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.
  - 3. Where the words "equal to" appear, followed by a manufacturer's name and sometimes a model or series designation, such designation is intended to establish quality level and standard features. Equal equipment by other manufacturers will be acceptable, subject to the Engineer's approval.
- B. Substitute equipment of equal quality and capacity will be considered when the listing of such is included as a separate item of the bid. State the deduction or addition in cost to that of the specified product.
- C. Before bidding equipment, and again in the preparation of shop drawings, verify that adequate space is available for entry and installation of the item of equipment, including associated piping and accessories. Also verify that adequate space is available for servicing of the equipment.
- D. If extensive changes in pipe or equipment layout, or electrical wiring and equipment are brought about by the use of equipment which is not compatible with the layout shown on the drawings, necessary changes shall be deemed to be included.

## 2.5 Shop Drawings

- A. Electronic copies of shop drawings and descriptive information of equipment and materials shall be furnished. Submit to the Architect and/or Engineer for review as stated in the General Conditions and Supplementary Conditions. These shall be submitted as soon as practicable and before equipment is installed and before special equipment is manufactured. Submittal information shall clearly identify the manufacturer, specific model number, approval labels, performance data, pump curves, electrical characteristics, features, specified options and additional information sufficient to evidence compliance with the contract documents. Product catalogs, brochures, etc. submitted without project specific items marked as being submitted for review will be rejected and returned without review. Shop drawings for equipment, fixtures, devices and materials shall be labeled and identified same as on the Contract Documents. If compliance with the above criteria is not provided shop drawings will be subject to rejection and returned without review. Samples shall be submitted when requested or as specified here with-in.
- B. The review of shop drawings by the Architect or Engineer shall not relieve the Contractor from responsibility for errors in the shop drawings. Deviations from specifications and drawing requirements shall be called to the Engineer's attention in a separate clearly stated notification at the time of submittal for the Engineer's review.
- C. Shop drawings of the following Fire Suppression equipment and materials shall be submitted:
  - 4. Pipe, fittings and joining methods.

5. Pipe hangers.
6. Sprinklers and accessories.
7. Sprinkler system installation drawings per NFPA 13, calculations and water supply flow curve.
8. Welder performance qualification record.

### **PART 3 - EXECUTION**

#### **3.1 Pipe Testing**

- A. Pipe testing for fire suppression piping shall be as described below and in Section 21 13 13 Fire Suppression Sprinkler System.
- B. Ensure that air is vented from piping when piping is hydrostatically tested.
- C. Tests shall be witnessed by field representatives of the Architect or Engineer or shall be monitored by a recorder. Furnish a written record of each piping system test indicating date, system, pressure, duration and results of tests. Copies of test reports shall be included in the O&M manuals.
- D. Leaks discovered during testing shall not be patched. Threaded connections shall be either tightened or replaced. Small leaks in welded pipe may be chipped and rewelded.

#### **3.2 Pipe Cleaning**

- A. Before placing each piping system in operation, the piping system shall be thoroughly flushed out with clean water.
- B. Refer to appropriate Sections for cleaning of other piping for normal operation.

#### **3.3 Operation and Adjustment of Equipment**

- A. As each piping system is put into operation, all items of equipment included therein shall be adjusted to proper working order.

#### **3.4 Operating Demonstration and Instructions**

- A. Set the various systems into operation and demonstrate to the Owner and Architect / Engineer that the systems function properly and that the requirements of the Contract are fulfilled.
- B. Provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems. A thorough review of the operating and maintenance manuals shall be included in these instructional meetings.
- C. O&M manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.

END OF SECTION

**21 05 02      AGREEMENT AND WAIVER FOR USE OF ELECTRONIC FILES**

**PART 1 - GENERAL**

- 1.1 The Engineer, at his sole discretion and without obligation, makes graphic portions of the contract documents available for use by the contractor in electronic format. These electronic files are proprietary, and remain the Engineer's Instruments of Service and shall be for use solely with respect to this project, as provided in the Standard Form of Agreement between Owner/Architect and Engineer.
- 1.2 Electronic files shall be released only after bids have been received for the project and contracts have been signed with the contractors.
- 1.3 The contractor shall acknowledge receipt of electronic files in the requested format for this project. The electronic files are provided as a convenience to the User, for use in preparing shop drawings and/or coordination drawings related to the construction of only the project identified in the Agreement. The electronic files and the information contained within are the property of the Engineer and/or the Architect and/or the Owner, and may not be reproduced or used in any format except in conjunction with the project identified in the Agreement.
- 1.4 The User acknowledges that the information provided in the electronic files is not a substitution or replacement for the Contract Documents and does not become a Contract Document. The User acknowledges that neither the Engineer, the Architect, the Consultants, the Client or the Owner make any warrant or representation that the information contained in the electronic files reflect the Contract Documents in their entirety. The User assumes full responsibility in the use of the electronic files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
- 1.5 The User acknowledges that the receipt of electronic files in no way relieves the User from the responsibility for the preparation of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
- 1.6 Electronic files are available in a .DWG or .RVT format for a cost as indicated in the Agreement and Waiver Form. **Providing the documents in a .DWG version that differs from the product version that the .DWG files were initially created in will incur additional charges per sheet, as indicated in the Agreement and Waiver Form.** Charges are for the Engineer's time to prepare the documents in the format stated. They are available through the Engineer's office on a C.O.D. basis only. A sample of the format will be provided by the Engineer upon request by the contractor, for the purpose of testing the compatibility of the format to the contractor's systems.
- 1.7 All drawings will be in an AutoCAD file format, when requested to be .DWG format.
- 1.8 All project models will be furnished without views.
- 1.9 All electronic files shall be stripped of the Project's name and address, the Architect's / and / Engineer's / and / any consultant's name and address, and any professional licenses indicated on the contract documents, (and all dimensions, verbiage, and statistical information). Use of these electronic files is solely at the contractor's risk, and shall in no way alter the contractor's Contract for Construction.
- 1.10 The User agrees to indemnify, hold harmless and defend the Engineer, the Architect, the Consultants, the Owner, the Client and any of their agents from any litigation resulting from the use of (by any means of reproduction or electronic media) these files. The Engineer makes no representation regarding fitness for any particular purpose, or suitability for use with any software

or hardware, and shall not be responsible or liable for errors, defects, inexactitudes, or anomalies in the data, information, or documents (including drawings and specifications) caused by the Engineer's or its consultant's computer software or hardware defects or errors; the Engineer's or its consultant's electronic or disk transmittal of data, information or documents; or the Engineer's or its consultant's reformatting or automated conversion of data, information or documents electronically or disk transmitted from the Engineer's consultants to the Engineer.

- 1.11 The contractor waives all claims against the Engineer, its employees, officers and consultants for any and all damages, losses, or expenses the contractor incurs from such defects or errors in the electronic files. Furthermore, the contractor shall indemnify, defend, and hold harmless the Engineer, and its consultants together with their respective employees and officers, harmless from and against any claims, suits, demands, causes of action, losses, damages or expenses (including all attorney's fees and litigation expenses) attributed to errors or defects in data, information or documents, including drawings and specifications, resulting from the contractor's distribution of electronic files to other contractors, persons, or entities.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

- 3.1 Attached "Agreement" shall be submitted with accompanying payment to the Engineer prior to delivery of electronic files.

END OF SECTION



**ELECTRONIC FILES  
HEAPY RELEASE FORM TO CONTRACTORS**

**Project:** Sinclair Community College  
EMS Classroom-SIM LAB  
444 West Third St  
Dayton, OH 45402

**Owner:** Sinclair Community College

**Heapy Engineering Project Number:** 2024-06062

**Heapy Engineering Project Manager:** Nick Andrews

The Provider, named below, will furnish the Recipient, named below, certain documents prepared by the Provider or its sub consultants in an electronic format. These documents are hereinafter collectively referred to as "Electronic Files". The Electronic Files are instruments of the Provider services performed solely for the Owner's benefit and to be used solely for this Project. The Provider does not represent that the information contained in the Electronic Files are suitable for use on any other project or for any other purpose. If the Electronic Files are used for any other project or purpose without the Provider's specific written permission, the risk of such use shall be assumed solely by the Recipient or other user.

**Prior to the use of the Electronic Files the Provider and the Recipient agree to the following terms and conditions:**

1. The Provider and Recipient fully understand that the data contained in these electronic files are part of the Provider's Instruments of Service. The Provider shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.
2. The Recipient confirms their request to the Provider for Electronic Files for the Project listed above, which the Recipient understands are to be provided only in accordance with, and conditioned upon, the terms and conditions of the Agreement and Waiver for Use of Electronic Files).
3. The Provider agrees that the Recipient may use the Electronic Files for the sole purpose of preparing shop drawings and/or coordination drawings for the above Project only. Any Electronic Files provided are strictly for the use of the Recipient in regard to the Project named above, and shall not be utilized for any other purpose or provided by the Recipient to any entity other than its subcontractors for the Project named above.
4. The Recipient acknowledges that the furnishing of Electronic Files in no way relieves the Recipient from the responsibility of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
5. The Recipient acknowledges:
  - a. That the Electronic Files do not contain all of the information of the Bid Documents or Contract Documents for the construction of the Project above.

- b. That information in the Bid Documents or Contract Documents may be revised or modified in the future.
  - c. The Provider does not have, and will not have, any duty or obligation to advise or give notice to the Recipient of any such revisions or modifications.
  - d. That the Recipient agrees that its use of the Electronic Files is at the Recipient's sole risk of liability, and that the Recipient shall make no claim or demand of any kind against the Provider arising out of Recipient's receipt or use of the Electronic Files.
6. The Provider makes no representation or warranty of any kind, express or implied, with respect to the Electronic Files and specifically makes no warranty that the Electronic Files shall be merchantable or fit for any particular purpose, or accurate or complete. Furthermore, any description of said Electronic Files shall not be deemed to create an implied or express warranty that such Electronic Files shall conform to said description.
  7. Due to the unsecured nature of the Electronic Files and the inability of the Provider or the Recipient to establish controls over their use, the Provider assumes no responsibility for any consequences arising out of the use of the data. It is the sole responsibility of the Recipient to check the validity of all information contained within the Electronic Files. The Recipient shall at all times refer to the Construction Documents of the project during all phases of the project. The Recipient shall assume all risks and liabilities resulting from the use of this data, and the Recipient agree(s) to waive any and all claims and liability against the Provider and its sub consultants resulting in any way from the use of the Electronic Files.
  8. Electronic Files are provided strictly as a courtesy by the Provider solely for the convenience of the Recipient, and are not part of the Bid Documents or Contract Documents for the Project. The Electronic Files do not replace or supplement the paper copies of any drawings, specifications, or other documents included in the Contract Documents for use on the project.
    - a. The Recipient assumes full responsibility in the use of Electronic Files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
  9. As stated herein, the possibility exists that the Electronic Files provided may differ from the Bid Documents or Contract Documents for construction of the Project. The Provider shall not be responsible, nor be held responsible, for differences between Electronic Files, the Bid Documents, and Contract Documents. The Bid Documents or Contract Documents for the Project may be modified by the Provider at any time, either before or after construction begins. The Provider has no responsibility, either before or after any such modification, to determine or to advise the Recipient whether any such modification causes Electronic Files provided to the Recipient to be out of date, inconsistent with the Bid Documents or Contract Documents, or otherwise unsuitable or unfit for use in any way.
  10. The Recipient assumes all risk and liability for any losses, damages, claims, or expenses (including defense and attorney fees) resulting from its receipt, use, or possession of Electronic Files furnished by the Provider. The Provider makes no representation, warranty or guarantee that the Electronic Files:
    - a. Are suitable for any other usage or purpose.
    - b. Have any particular durability.
    - c. Will not damage or impair the Recipient's computer or software.
    - d. Contain no errors or mechanical flaws or other discrepancies that may render them unsuitable for the purpose intended by the Recipient.



11. Recipient agrees to indemnify, defend and hold harmless the Provider, agents, employees, and the Owner from, and against, any and all claims, suits, losses, damages or costs, of any kind or nature, including attorney's fees, arising from or by reason of the Recipient's use of Electronic Files provided by the Provider, and such defense and indemnification obligation duties shall survive any use under this Agreement and Waiver for Use of Electronic Files.
12. The Recipient agrees that the Provider shall have no responsibility whatsoever for problems of any nature arising from transmitting and storing electronic files at a Recipient requested FTP or project management site or the conversion of the Electronic Files by the Recipient or others for use in non-native applications. The Provider will not provide Electronic Files in compressed formats. Recipient agrees to accept the files in the format provided by the Provider, and that Recipient's conversion or electronic file storage at the Recipient's requested site, shall be at Recipient's sole risk.
13. Recipient acknowledges:
  - a. That the Electronic Files provided by the Provider are a graphical representation of the building in order to generate two-dimensional industry standard drawings.
  - b. That the data contained in the Electronic Files may not be 100% accurate and should not be used for dimensional control, building layout, shop drawings, or any other similar purpose
  - c. That any schedule of materials produced directly from the Electronic Files has not been checked for accuracy.
  - d. That the information in the Electronic Files should be used only for comparative purposes and shall not be relied upon for accurate quantity estimates or used in establishing pricing.
14. Electronic Files provided by the Provider will only contain elements and content that the Provider deems necessary and appropriate to share. No specific Level of Development (LOD) is implied or expected. The Recipient agrees that no proprietary content, MvParts or Revit Families or any other AutoCAD MEP or Revit MEP content shall be removed from the model and/or used for any other purpose but to support this specific project.
15. The Provider, at its sole discretion, may modify the Electronic files before they are provided to the Recipient. Such modifications may include, but are not necessarily limited to, removal of certain information. The Provider, at its sole discretion, may refuse to provide some or all Electronic Files requested by Recipient.
16. The availability of Electronic Files that were not prepared by the Provider is subject to the consent of the Owner or consultant that prepared those Electronic Files. The Provider will not negotiate with the Owner or consultant or repeatedly solicit the Owner or consultant to obtain such consent. Neither this Agreement and Waiver for Use of Electronic Files nor any such separate Consultant's consent may be assigned or transferred by Recipient to any other person or entity.

Provider (Name of Company): \_\_\_\_\_

Recipient (Name of Company): \_\_\_\_\_

Recipient Address: \_\_\_\_\_

Name of authorized Recipient Representative: \_\_\_\_\_

Title of authorized Recipient Representative: \_\_\_\_\_

E-mail address of authorized Recipient Representative: \_\_\_\_\_

Signature of authorized Recipient Representative: \_\_\_\_\_

Date: \_\_\_\_\_

NOTE: Select requested Electronic File Format, File Transfer Medium and complete applicable Cost Summary.

**A. Electronic File Format (select one):**

1.  .DWG Format - List of Drawings Requested: \_\_\_\_\_
2.  Revit Project Model Requested (Model only, no Views included)

**B. File Transfer Medium (select one):**

- CD-ROM     DVD-ROM     Heapy FTP     User's FTP site     Flash Drive

**C. Delivery of Electronic Files Cost Summary:**

Available Electronic .DWG file format:

- 2024 DWG

If a different file version is required than the indicated available version state the requested version:

\_\_\_\_\_ .DWG

**Note that an additional charge per sheet will be incurred.**

Cost of Preparation of Division 21 Electronic .DWG Files:

First Drawing: \$50.00 \$50.00

Additional Drawings \$15.00 each \_\_\_\_\_ x \$15.00 = \$ \_\_\_\_\_

Conversion to .DWG version different from available .DWG:  
\$5.00 additional/sheet \_\_\_\_\_ x \$ 5.00 = \$ \_\_\_\_\_

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_

All files will be bound together.

Available electronic Revit file format:

- 2024 .RVT

Cost of Preparation of Division 21 Electronic Revit Model Files:

Revit Project Model without Views \$500.00

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_



**21 05 04 BASIC FIRE SUPPRESSION MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 Construction Water

- A. Refer to Division 01 - General Requirements, for information regarding construction water.
- B. Each Contractor requiring water for construction purposes shall connect to wall hydrants or other connection points within the existing building.

1.2 Continuity of Services

- A. Work shall be so planned and executed as to provide reasonably continuous service of existing systems throughout the construction period. Where necessary to disrupt services for short periods of time for connection, alteration or switch-over, the Owner and Architect shall be notified in advance and outages scheduled at the Owner's reasonable convenience.
- B. Submit, on request, a written step-by-step sequence of operations proposed to accomplish the work. The outline must include tentative dates, times of day for disruption, downtime and restoration of services. Submit the outline sufficiently in advance of the proposed work to allow the Architect or Engineer to review the information with the Owner. Upon approval, final planning and the work shall be done in close coordination with the Owner.
- C. Shutdown of systems and work undertaken during shutdowns shall be bid as being done during normal working hours. If the Owner should require such work be performed outside of normal working hours, reimbursement shall be made for premium time expenses only, without markup.

**PART 2 - PRODUCTS – Not Applicable**

**PART 3 - EXECUTION**

3.1 Workmanship

- A. Materials and equipment shall be installed and supported in a first-class and workmanlike manner by mechanics skilled in their particular trades. Workmanship shall be first-class in all respects, and the Architect and Engineer shall have the right to stop the work if highest quality workmanship is not maintained.
- B. Fire Suppression work shall be performed by Contractors that are fully certified by the State or Authority Having Jurisdiction.

3.2 Protection

- A. Each Contractor shall be entirely responsible for all material and equipment furnished in connection with their work. Special care shall be taken to properly protect all parts thereof from theft, damage or deterioration during the entire construction period in such a manner as may be necessary, or as directed by the Architect. All piping shall be elevated from grade for on-site storage, and all open ends shall be covered. Plastic piping shall be protected from direct and indirect sunlight.

- B. The Owner's property and the property of other contractors shall be scrupulously respected at all times. Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

### 3.3 Cutting and Patching

- A. Refer to Division 01 - General Requirements for information regarding cutting and patching.
- B. Plan the work well ahead of the general construction. Where pipes are to pass thru new walls, partitions or ceilings, place sleeves in these elements or arrange for the provision of openings where sleeves are not practical. Where sleeves or openings have not been installed, cut holes and patch as required for the installation of this work. Any damage caused to the building shall be repaired or rectified.
- C. Where pipes are to pass thru, above or behind existing walls, partitions or ceiling, cutting, patching and refinishing of same shall be provided. Core drilling and saw cutting shall be utilized where practical. Contractor to examine where walls, etc. are to be cut for presence of existing utilities.
- D. All sleeves and openings not used or partially used shall be closed to prevent passage of smoke and fire.
- E. All materials, methods and procedures used in patching and refinishing shall be in accordance with applicable provisions of specifications governing the various trades, and shall be completed by skilled workmen normally engaged in these trades. The final appearance and integrity of the patched and refinished areas must meet the approval of the Architect. Wall and ceiling refinishing must extend to logical termination lines (entire ceiling of the room repainted, for instance), if an acceptable appearance cannot be attained by finishing a partial area.

### 3.4 Removals, Alterations and Reuse

- A. Refer to the project documents for the scope of remodeling in the existing building.
- B. Cooperate with the Prime Contractor regarding all removal and remodeling work. Unless otherwise noted, remove all existing work which is associated with Division 21 and which will be superfluous when the new work is installed and made operational.
- C. Extraneous piping which is or becomes accessible shall be removed and stubs shall be capped at the first active pipe encountered. Piping that is and remains inaccessible shall be disconnected from active systems and abandoned. Ends of abandoned pipe shall be capped so as to be concealed by finished surfaces. Upon completion of the work no abandoned pipe, valve or stub shall extend thru finished floors, walls or ceilings.
- D. When it is necessary to reroute a section of active piping the rerouted section shall be installed before removing the existing in order to minimize system down time.
- E. Materials and equipment which are removed shall not be reused within the scope of this project unless specifically noted to be relocated or reused. Turn over to the Owner and place where directed on the premises all removed material and equipment so designated by the Owner. All material and equipment not claimed by the Owner shall become the property of the Contractor responsible for removal and shall be removed from the premises.

- F. Remove, store and reinstall lay-in ceiling tile and grid as needed to perform work in areas where such removal and re-installation is not to be done by the Prime Contractor. Damaged tile and/or grid shall be replaced with new matching tile and/or grid.
- G. In areas of minor work where the space is not completely vacated, temporarily move portable equipment and furnishings within the space as required to complete the work. Coordinate this activity with the Architect. Protect the Owner's property by providing dust covers and temporary plastic film barriers to contain dust. Remove barriers and return equipment and furniture upon completion of the work.
- H. Refinish any surface disturbed under this work to match existing, except where refinishing of that surface is included under the General Contract.

### 3.5 Painting

- A. In addition to any painting specified for various individual items of equipment, provide the following painting:
  - 1. Ferrous metal which is not factory or shop painted or galvanized and which remains exposed to view in the finished areas of the building shall be given a prime coat of paint.
  - 2. Ferrous metal installed outside the building which is not factory or shop painted or galvanized shall be given a prime coat of paint.
  - 3. Equipment and materials, except sprinklers, which have been factory or shop coated (prime or finished painted or galvanized), on which the finish has been damaged or has deteriorated, shall be cleaned and refinished equal to its original condition. The entire surface shall be repainted if a uniform appearance cannot be accomplished by touch up. Sprinklers and sprinkler assemblies shall be replaced with new.
  - 4. Apply Z.R.C. 221 cold galvanizing compound, or approved equal, for touch-up and repair of previously galvanized surfaces.
- B. Paint, surface preparation and application shall conform to the paint manufacturer's instructions and applicable portions of the Painting section of Division 09 Specifications. All rust must be removed before application of paint.
- C. Finish painting is included in the General Contract.

END OF SECTION





**21 05 05 FIRESTOPPING**

**PART 1 - GENERAL**

- 1.1 Firestopping assemblies shall be provided at penetrations of piping thru fire rated floors, fire rated floor-ceiling and roof ceiling assemblies, fire rated walls and partitions and fire rated shaft walls and partitions. In addition, firestopping assemblies shall be provided at penetrations thru 0-hour rated floors. Refer to the drawings for fire rated building elements and pipe layouts.
- 1.2 Firestopping assemblies shall be tested and rated in accordance with ASTM E814, E119 and listed in accordance with UL 1479, as published in the UL Fire Resistance Directory. Firestopping shall provide a fire rating equal to that of the construction being penetrated.
- 1.3 Firestopping materials, assemblies and installation shall conform to requirements of the OBC and the Authority Having Jurisdiction.
- 1.4 For those firestopping applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.5 Shop drawings shall be prepared and submitted for review and approval. Submittals shall include manufacturer's specifications and technical data of each material, documentation of UL firestopping assemblies and installation instructions. Submittals shall include all information required in the OBC Chapter 1, Section 106 and Chapter 7, Section 712.

**PART 2 - PRODUCTS**

- 2.1 Firestopping materials shall be manufactured and/or supplied by Hilti, 3M, Rectorseal-Metacaulk, Tremco, Nelson, Specified Technologies or other approved manufacturer.
- 2.2 Materials shall be in the form of caulk, putty, sealant, intumescent material, wrap strip, fire blocking, ceramic wool and other materials required for the UL listed assemblies. These shall be installed in conjunction with sleeves and materials for fill and damming.
- 2.3 Combination pre-set floor sleeve and firestopping assemblies shall be equal to Hilti CP 680.

**PART 3 - EXECUTION**

- 3.1 Installation of all materials and assemblies shall be in accordance with UL assembly drawings and the manufacturer's instructions.
- 3.2 Installation shall be done by an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary training and experience.
- 3.3 Refer to 21 05 07 Piping Materials and Methods for Fire Suppression for pipe sleeve requirements and treatment of penetrations not requiring firestopping.

END OF SECTION



## **21 05 07 PIPING MATERIALS AND METHOD FOR FIRE SUPPRESSION**

### **PART 1 - GENERAL**

- 1.1 Piping materials and methods for piping common to Division 21 – Fire Suppression shall be as specified herein and as shown on the drawings.
- 1.2 Included in this section are:
  - A. Pipe, fittings and joining methods.
  - B. Unions and flanges.
  - C. Pipe sleeves, openings and escutcheons.
  - D. Installation methods of piping.
- 1.3 Refer to other Sections in Division 21 for selection of piping materials for the various services. Piping materials and installation methods peculiar to certain individual systems are specified in Sections related to those systems.
- 1.4 Refer to Section 21 05 05 Firestopping and Division 7 for firestopping requirements.
- 1.5 Welders shall be qualified and fully certified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications.
- 1.6 Welding procedures, testing and welder performance shall comply with The American Welding Society Welding Handbook, AWS B2.1, Specification for Welding Procedure and Performance Qualification and National Welding Institute.
- 1.7 Pipe threads shall be cut to ASME B1.20.1, Pipe Threads, General Purpose.
- 1.8 Pipe sleeves, wall openings and escutcheon plates shall be provided as described below. Pipe sleeves shall be placed in all walls and partitions, except as noted below, to allow new piping to pass thru and to allow for expansion, contraction and normal movement of the pipe. Sleeves are also required for all existing piping related to this trade in new walls, partitions, same as for new piping.
- 1.9 Sleeves are not required:
  - A. In stud and gypsum board or plaster walls and partitions which are not fire rated.
  - B. For above grade uninsulated pipe passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions.
- 1.10 Where pipes penetrate walls other than those required to be fire rated, the annular space between the sleeve, core drilling or opening and the pipe or pipe insulation shall be closed to retard the passage of smoke.

### **PART 2 - PRODUCTS**

- 2.1 For detail of pipe and fitting products see Section 21 13 12 Fire Suppression Piping.

- 2.2 Forged welding outlets equal to Anvil/Merit "Weld-Miser Tee-let" may be used where branch is two sizes smaller than the main. Outlets shall be rated for minimum 300 psi working pressure, UL Listed and FM Global Approved, and have threaded or grooved end appropriate for application. Non-listed nipples and fishmouthed connections are not acceptable.
- 2.3 Unions and flanges shall be:
- A. Unions on steel pipe 2 inches and smaller, malleable iron with ground seat, bronze to steel, 300 lbs., screwed ends.
  - B. Flanges on steel pipe with welded or screwed joints, 2.5 inches and larger. Gaskets shall be 0.0625 inches thickness, ASME B16.21, full face compressed sheet suitable for temperature and pressure ranges of the application.
  - C. Mechanical joints associated with grooved end pipe are acceptable in lieu of unions and flanges.
- 2.4 Pipe sleeves shall be:
- A. 26 gauge galvanized sheet steel or Schedule 40 black steel pipe in other than poured concrete.
  - B. Galvanized sheet metal for existing pipes passing thru new walls and partitions (26 gauge).
  - C. Combination pre-set floor sleeve and firestopping assembly equal to Hilti CP 680. Refer to 21 05 05 Firestopping.

### **PART 3 - EXECUTION**

- 3.1 Pipe and tubing shall be cut and fabricated to field measurements and run parallel to normal building lines. Pipe ends shall be cut square and ends reamed to remove burrs. The pipe interior shall be cleaned of foreign matter before erection of the pipe.
- 3.2 Piping shall be installed consistent with good piping practice, run concealed wherever possible and located as to be protected from damage by freezing. Coordinate with other trades to attain a workmanlike installation.
- 3.3 Piping shall be supported as specified in Section 21 05 29 Hangers and Supports for Fire Suppression Piping. Piping with mechanical joints for grooved end steel pipe shall be supported in accordance with the manufacturer's recommendations. Pipe alignment in both the horizontal and vertical must be tightly maintained. Misalignment must be corrected to the satisfaction of the Engineer before the system is accepted.
- 3.4 Close open ends of piping during installation to keep interior of the pipe clean.
- 3.5 Piping shall not be run above electrical switchgear or panelboards, nor above the access space in the immediate vicinity of the equipment, in accordance with the N.E.C..
- 3.6 Unions and flanges shall be installed at pipe connections to equipment and as required for erection purposes.
- 3.7 Length of wall sleeves shall be such that the sleeve ends are substantially flush with both sides of the wall or partition. Refer to the following paragraph for qualifications and exceptions relating to firestopping.

END OF SECTION



**21 05 29 HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING**

**PART 1 - GENERAL**

- 1.1 All piping shall be supported from the building structure.
- 1.2 All products and assemblies installed within a plenum shall not exceed a maximum flame spread of 25 and a smoke development of 50 as established by UL 723 or ASTM E84 test methods. However, "discrete" combustible components as defined by the mechanical code may be UL 2043 listed in lieu of UL 723 or ASTM E84.

**PART 2 - PRODUCTS**

- 2.1 Manufacturers listed below are basis of design. Other approved equal manufacturers are B-line, Erico, Mason, PHD and TOLCO.
- 2.2 Hangers and supports for horizontal piping shall be UL listed and/or FM Global approved, and equal to:
  - A. Pear shaped band hangers with adjustable swivel ring, lock nut and rod attachment - Anvil Fig. 69.
- 2.3 Hanger rods shall be solid steel, threaded end or all thread rod, of diameter listed below. A hanger attachment device (beam clamps, concrete inserts, etc.) and locking nuts at the hanger attachment shall be provided on each hanger. Locking nuts shall be provided at each clevis, trapeze and swivel ring type hanger.

Pipe Sizes	Min. Rod Dia.
4" and smaller	0.375"

- 2.4 Hanger rod attachment devices for attachment to the structure shall be:
  - A. After-set steel expansion type concrete inserts.
  - B. Beam clamps for steel construction equal to Anvil Fig. 92, 93, 94 or 14.

**PART 3 - EXECUTION**

- 3.1 Spacing of hangers and supports shall be as specified herein and, in addition, spacing and hanging methods in conformance with NFPA Standards when more stringent.
  - A. Steel pipe (vertical) – at the base, at each floor level, and 15 ft. maximum spacing.
  - B. Steel pipe (horizontal) – 12 ft. intervals for piping 1.25 inch size and smaller, 15 ft. spacing for piping 1.5 inches and larger pipe.
- 3.2 In piping systems with rolled or cut groove end pipe and mechanical joint couplings, pipe hangers shall be provided on horizontal piping at normal specified intervals and, in addition, so that no pipe shall be left unsupported between any two couplings nor left unsupported whenever a change in direction takes place. Vertical piping shall be supported at normal specified intervals or every other pipe length, whichever is more frequent. The base of the riser or base fitting shall be supported.

- 3.3 Attachment of pipe hangers to the structure shall be with:
- A. After-set concrete inserts, in 4 inch minimum depth concrete, set in drilled holes. Powder actuated driven fasteners are not permitted.
  - B. Beam clamps in steel construction. Provide anchoring where clamps are attached to sloping surfaces of beam flanges and where otherwise required to ensure permanent attachment. Attachment to the bar type joists shall be at joist panel points only.
  - C. Attachment to steel deck is prohibited. Span from steel structural members with supplementary steel shapes where direct attachment to structural members is not practical. This does not apply to steel deck with concrete slab poured on the deck. Refer to A. and B. above.
- 3.4 Pipe hangers shall be adjusted to proper elevation, hanger rods set in a vertical position and locking nuts secured before pipe insulation is installed.
- 3.5 Hanger and support assemblies which are not factory plated (galvanized or copper) and will remain exposed on completion of the project shall be painted before installation.
- 3.6 Do not bend hanger rod to set in vertical position. Use manufactured hanger rod attachments that swivel to allow the hanger rods to hang vertically, or provide supplemental steel attached to the building structure and standard hanger rod attachments to allow the hanger rods to hang vertically. Refer to the following Manufacturers Standardization Society (MSS) Standard practices on pipe hangers and supports:
- A. MSS SP-58 on Materials, Design and Manufacturer
  - B. MSS SP-69 on Selection and Application
  - C. MSS SP-89 on Fabrication and Installation Practices

END OF SECTION



## **21 05 53 IDENTIFICATION OF FIRE SUPPRESSION PIPING**

### **PART 1 - GENERAL**

- 1.1 Identification of fire suppression equipment shall consist of pipe marking as specified hereinafter.
- 1.2 Pipe markings shall be applied to all piping.
- 1.3 Labels, tags and markers shall comply with ANSI A13.1 for lettering size, colors and length of color field.
- 1.4 Coordinate pipe markings to ensure similar markings.

### **PART 2 - PRODUCTS**

- 2.1 Pipe markings shall be:
  - A. Plastic semi-rigid snap-on type, manufacturer's standard pre-printed color coded pipe markers extending fully around the pipe or pressure-sensitive vinyl markers similar to the above.
  - B. Arrows for direction of flow provided integral with the pipe marker or separate at each marker.
- 2.2 Labels, markings and tags shall be manufactured by W.H. Brady, Seton, Allen, Kolbi, MSI or Industrial Safety Supply.

### **PART 3 - EXECUTION**

- 3.1 Identification marking shall be applied after painting has been completed.
- 3.2 Coordinate names, abbreviations and other designations used in Division 21 identification work, with corresponding designations shown, specified or scheduled on drawings.
- 3.3 The Division 21, 22 and 23 marking shall be coordinated and consistent systems of identification.
- 3.4 Pipe markers shall be placed:
  - A. At 25 ft. centers in mechanical rooms and concealed spaces.
  - B. At 50 ft. centers in other exposed locations.
  - C. On mains at each branch take-off.
  - D. At least once in each room.

END OF SECTION



## 21 13 12 FIRE SUPPRESSION PIPING

### PART 1 - GENERAL

- 1.1 Piping and devices for the fire suppression system shall be provided as shown on the drawings, as specified and as required for a complete system.
- 1.2 Piping and associated devices and materials shall conform to provisions of Section 21 05 07 Piping Materials and Methods for Fire Suppression, Section 21 05 29 Hangers and Supports for Fire Suppression Piping and as specified in this and other Fire Suppression sections.
- 1.3 Pipe, fittings and joints shall conform to specifications and standards references of NFPA 13 Standard for the Installation of Sprinkler Systems.
- 1.4 Fire suppression system materials and components shall be UL listed and / or FM Global approved for fire suppression service. Piping, fittings, valves and system components shall be rated at not less than 175 psi or greater so that system pressures do not exceed working pressure ratings.
- 1.5 Welding in place will be permitted only if written approval is obtained from the authority having jurisdiction. Welders and welding procedures in both the shop and in the field shall conform to AWS B2.1, Specification for Qualification of Welding Procedures and Welders for Piping and Tubing. Welding of galvanized piping is prohibited.

### PART 2 - PRODUCTS

- 2.1 Pipe, fittings and joining methods shall be:
  - A. TYPE F1 - Wet Pipe System  
Pipe - Schedule 40 black steel, ASTM A53, Type E or F, or ASTM A135. Fittings and joints - malleable or cast iron screwed type or flanged.
  - B. TYPE F2 - Wet Pipe System  
Pipe - Schedule 40 black steel, ASTM A53, Type E or F, or ASTM A135, with mechanically rolled or cut groove ends.  
Fittings and joints – grooved-end joint with malleable or ductile iron body, ASTM A-536 or A-47 and nitrile or EPDM gaskets. Victaulic "Firelock" Style 005 or 009 rigid, Victaulic IGS or equal by AnvilStar "Gruvlok" or Tyco/Grinnell. All fittings and couplings shall be of the same manufacturer.
- 2.2 Grooved-end coupling specialty fittings and accessories such as ANSI class flange adaptors, reducing couplings and combination outlet-couplings that utilize grooved-end joining with torsion nuts and bolts shall be permitted. Other couplings and accessories, such as boltless couplings, and hole-cut mechanical – t outlets, strapless outlets and similar fittings using pipe-surface seals shall not be permitted unless specifically approved by the Engineer.
- 2.3 Flexible sprinkler connection assemblies shall be fully welded, non-mechanical fitting type, with minimum 1 inch internal diameter corrugated type 304 stainless steel hose, type 304 stainless steel braided outer cover and collar, 1 inch NPT male inlet and stainless steel or carbon steel 1 inch x 0.5 inches or 1 inch x 0.75 inches NPT female reducer outlet. Seals, when utilized shall be EPDM. Ceiling bracket shall be direct attachment type having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws and a removable attachment hub with a set screw. Ceiling attachment shall incorporate a tamper resistant label for visual verification of inappropriate removal or relocation. The flexible sprinkler connection assembly shall be UL listed

and FM Global approved for fire protection service, and seismically qualified pursuant to ICC-ESAC-156. Flexible sprinkler connection assemblies shall be Flex Head Model #20XX, Victaulic VicFlex, or approved equal.

- 2.4 Unions, flanges and pipe sleeves shall be as described in Section 21 05 07 Piping Materials and Methods for Fire Suppression.
- 2.5 Pipe hangers and supports shall be UL listed or FM approved and shall be as described in Section 21 05 29 Hangers and Supports for Fire Suppression Piping.

### **PART 3 - EXECUTION**

- 3.1 Installation of piping, hangers, sleeves and other components shall conform to NFPA 13 for sprinkler systems, Section 21 05 07 Piping Materials and Methods for Fire Suppression, and Section 21 05 29 Hangers and Supports for Fire Suppression Piping.
- 3.2 Grooved-end joint type couplings shall be installed in strict conformance with manufacturer's recommendations, including torquing of coupling bolts to recommended levels.
- 3.3 Flexible sprinkler connection assembly calculation requirements and installation methods with respect to permitted bend radius and number of bends, and hanger and support requirements shall strictly adhere to the manufacturer's documented listing instructions.

END OF SECTION

**21 13 13 FIRE SUPPRESSION SPRINKLER SYSTEM**

**PART 1 - GENERAL**

- 1.1 Provide modifications of and additions to an existing wet-pipe sprinkler system as outlined on the drawings and as specified.
- 1.2 The sprinkler system shall conform to requirements of NFPA 13, OBC and other requirements of the authority having jurisdiction.
- 1.3 All materials and devices, as appropriate, shall be UL Listed, and acceptable to the authority having jurisdiction.
- 1.4 Bidders on Division 21 work shall be regularly engaged in the installation of the respective fire control systems and shall be fully certified by the State or authority having jurisdiction, as applicable. Bidders shall provide a list of approved operational installations upon request.
- 1.5 Obtain and pay for a permit and other applicable fees.
- 1.6 Perform a hydrant flow test to verify data on the drawings and to serve as the basis for hydraulic calculations in sizing of piping and other elements of the system. Calculations shall include not less than a 5 psi safety factor. Service and main pipe sizes shown on the drawings shall not be reduced. Flow tests performed within 6 months of the date of permit will be acceptable. A copy of the flow test report shall be included with the submitted hydraulic calculations.
- 1.7 Hydraulic calculations shall be based on minimum area of operation as indicated on the drawings. Area of operation reductions for quick response and extended coverage sprinklers are acceptable.
- 1.8 Installation drawings for the sprinkler system shall be developed showing all information needed to obtain approval from the authority having jurisdiction. A summary sheet shall be included showing all pertinent information per NFPA 13. Drawings shall be submitted to the Engineer for review and to the authority having jurisdiction for approval.
- 1.9 On gridded systems (if provided) velocities shall be a maximum of 20 fps for pipe sizes 2 inches and smaller and 30 fps for 2.50 inches and larger. No gridded system branch lines (serving multiple sprinklers) shall be smaller than 1.25 inches. Velocities on all other systems shall be a maximum of 30 fps for all pipe sizes.
- 1.10 Pipe, fittings, valves, accessories, devices and installation shall be as specified in 21 13 12 Fire Suppression Piping. Refer to 21 13 15 for Fire Suppression Equipment.

**PART 2 - PRODUCTS**

- 2.1 Sprinklers, unless otherwise noted, shall be quick-response frangible bulb or fusible solder style having a temperature range suitable for the application and pressure rating in excess of the maximum system pressure, with a minimum operating pressure of 175 psi. Refer to the drawings for sprinkler types, finishes and features. Escutcheon plates for pendent and sidewall sprinklers shall be two-piece to allow removal of the escutcheon and sprinkler without disturbing the ceiling or wall. Escutcheon plates shall be a part of the listed sprinkler assembly.
- 2.2 Flexible sprinkler drops are acceptable.

- 2.3 Special coatings shall be factory applied by the sprinkler manufacturer only. Field application of coatings or finishes that would nullify the UL listing or FM Global approval of the sprinkler is prohibited.
- 2.4 Spare sprinklers and sprinkler wrenches shall be furnished in accordance with the requirements of NFPA 25. Stock of spare sprinklers shall be representative of, and in proportion to, the number of each type, temperature, and pressure rating of the sprinklers installed. At least one wrench of each type shall be provided. Provide a wall mounted steel cabinet for spare sprinklers and wrenches.

### **PART 3 - EXECUTION**

- 3.1 Pendent type sprinklers shall be located in the center of square suspended ceiling tile and at the center or at quarter points of the long axis of rectangular suspended ceiling tile. The acceptability of alternate layouts will be contingent upon obtaining the Architect's approval regarding the location of the sprinklers. Additional sprinklers, if not more than 5 percent of the total number required, and related piping that may be required to maintain the continuity of a desired ceiling pattern or to accommodate an unforeseen condition shall be deemed to be included in the contract.
- 3.2 Piping Installation
  - A. The location of piping and devices shall be coordinated with other trades to ensure proper fit of all building systems and adequate access to test stations, control valves and water flow alarms. Sprinkler piping shall be so located as to be protected from damage by freezing.
  - B. Piping in exposed areas shall be installed without diminishing exit access widths, corridors or equipment access. Exposed horizontal piping, including drain piping, shall be installed to provide maximum headroom.
  - C. In areas with suspended or drop ceilings and in areas with concealed spaces above the ceiling, piping shall be concealed above ceilings. Piping shall be inspected, tested and approved before being concealed. Risers and similar vertical runs of piping in finished areas shall be concealed.
- 3.3 Sprinkler Installation
  - A. Drop nipples to pendent sprinklers shall consist of minimum 1 inch pipe with a reducing coupling into which the sprinkler shall be threaded. Arm-overs shall be used to connect sprinkler to branch piping where possible.
  - B. Sprigs to upright sprinklers shall contain no fittings between the branch line tee and the reducing coupling at the sprinkler. Riser nipples exceeding 30 inches in length shall be individually supported.
- 3.4 The entire piping system shall be hydrostatically tested at 200 psig minimum and not less than 50 psi above the maximum system pressure. Test pressure shall be applied for a period of not less than 2 hours and shall be measured at the low point of the piping being tested. Piping shall show no leakage by visual inspection and by pressure gauge reading. On dry pipe and preaction system successfully complete 24 hour air pressure test prior to conducting hydrostatic test. Testing procedure and pertinent data shall be recorded and made available to the Owner and to the authority having jurisdiction. Remove air from system piping before proceeding with the test.
- 3.5 Conduct all flow and flow alarm tests as required by NFPA 13.

END OF SECTION

## **22 05 01 BASIC PLUMBING REQUIREMENTS**

### **PART 1 - GENERAL**

#### 1.1 Special Note

- A. All provisions of the Bidding Requirements, General Conditions, Supplementary Conditions including Divisions 00 and 01, apply to work specified in this Division.
- B. Understanding that the contractors for various Divisions are sub-contractors to the Prime Contractor, assignments of work by division are not intended to restrict the Prime Contractor in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.

#### 1.2 Permits and Regulations

- A. Include payment of all permit and inspection fees applicable to the work in Division 22. Furnish for the Owner certificates of approval from the governing inspection agencies, as a condition for final payment.
- B. Work must conform to applicable local, state and federal laws, ordinances and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. Install no work contrary to minimum legal standards.

#### 1.3 Inspection of Site

- A. Each bidder shall inspect the premises of the existing building. Conditions shall be compared with information shown on the drawings. Report immediately to the Architect any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

#### 1.4 Drawings and Specifications

- A. The contractor shall refer to the architectural drawings for areas of scope and division of work between the two separate projects indicated. Contractors shall provide separate bid numbers for work associated with the Chemistry/Biology spaces and Allied Health spaces as indicated on the architectural drawings and specifications. Refer to description of work in the front end specifications for further information.
- B. The drawings indicate the general arrangement of the work and are to be followed insofar as possible. The word "provide", as used, shall mean "furnish and install". If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Architect for approval before proceeding with the work.
- C. Make all necessary field measurements to ensure correct fitting. Coordinate work with all other trades in such a manner as to cause a minimum of conflict or delay.
- D. The drawings and specifications shall be carefully studied during the course of bidding and construction. Any errors, omissions or discrepancies encountered shall be referred immediately to the Architect for interpretation or correction, so that misunderstandings at a later date may be avoided. The contract drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Having pipe and fittings

fabricated and delivered in advance of making actual measurements shall not be sufficient cause to avoid making offsets and minor changes as may be necessary to install piping and equipment.

- E. The Architect shall reserve the right to make minor adjustment in locations of system runs and components where considered desirable in the interest of concealing work or presenting a better appearance where exposed. Any such changes shall be anticipated and requested sufficiently in advance as to not cause extra work, or unduly delay the work. Coordinate work in advance with all other trades and report immediately any difficulties which can be anticipated.
- F. Equipment or piping shall not be installed in the dedicated electrical space above or in the working space required around electrical switchgear, motor control centers or panelboards as identified by the National Electric Code (NEC).
- G. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict. The Architect's decision shall be final in regard to the arrangement of equipment, piping, etc., where conflict arises.
- H. Provide offsets in system runs, additional fittings, necessary drains and minor valves, traps and devices required to complete the installation, or for the proper operation of the system. Exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- I. Should overlap of work among the trades become evident, this shall be called to the attention of the Architect. In such event, none of the trades or their suppliers shall assume that they are relieved of the work which is specified under their branch until instructions in writing are received from the Architect.

#### 1.5 Coordination Drawings

- A. The Division 23 Contractor shall prepare and be responsible for 0.25 inch scale electronic coordination drawings. These drawings shall be produced using a computer aided drafting software of a mutually agreed upon format with the Division 21, 22, 23, 26, 27 and 28 Contractors. Each Contractor shall prepare their own electronic drawings, using common backgrounds obtained from the Architect and Structural Engineer. The Division 23 Contractor shall be responsible for consolidating (merging) the drawings into combined coordination drawings, and lead the conflict resolution process, with all contractors working together to obtain finished coordinated drawings. No work shall be installed until all contractors have approved and signed-off with their approval and drawings have been submitted and reviewed by the Engineer.
- B. Review by the Engineer is cursory. It is the Contractors responsibilities to ensure that all work is coordinated, including fit above ceilings and that specified ceiling heights are maintained.

#### 1.6 Inspection

- A. All work shall be subject to inspection of Federal, State and local agencies as may be appropriate, and of the Architect and Engineer.
- B. Obtain final inspection certificates and turn over to the Owner.

#### 1.7 Record Drawings



- A. Maintain a separate set of prints of the contract documents and hand mark all changes or variations, in a manner to be clearly discernible, which are made during construction and the coordination process. Upon completion of the work and within 90 days of system acceptance, these drawings shall be turned over to the Architect. This shall apply particularly to underground and concealed work, and to other systems where the installation varies to a degree which would justify recording the change.

#### 1.8 Operating and Maintenance Manuals

- A. Assemble three copies each of operating and maintenance manuals for the Plumbing work.
- B. All "approved" shop drawings and installation, maintenance and operating instruction pamphlets or brochures, wiring diagrams, parts list and other information, along with warranties, shall be obtained from each manufacturer of the principal items of equipment. In addition, prepare and include a chart listing all items of equipment which are furnished under this contract, indicating the nature of maintenance required, the recommended frequency of checking these points and the type of lubricating media or replacement material required. Name and address of a qualified service agency. A complete narrative of how each system is intended to operate.
- C. Pipe pressure test reports, domestic water disinfection certificate of completion and bacteriological analysis results shall also be included.
- D. These shall be assembled into three-ring loose leaf binders or other appropriate binding. An index and tabbed sheets to separate the sections shall be included. These shall be submitted to the Engineer for review. Upon approval, manuals shall be turned over to the Owner.

#### 1.9 Final Inspection and Punch List

- A. As the time of work completion approaches, survey and inspect the work and develop their own punch list to confirm that it is complete and finished. Then notify the Architect and request that a final inspection be made. It shall not be considered the Architect's or Engineer's obligation to perform a final inspection until the Contractor has inspected the work and so states at the time of the request for the final inspection.
- B. Requests to the Architect, Engineer for final inspection may be accompanied by a limited list of known deficiencies in completion, with appropriate explanation and schedule for completing these; this is in the interest of expediting acceptance for beneficial occupancy.
- C. The Architect and/or Engineer will inspect the work and prepare a punch list of items requiring correction, completion or verification. Corrective action shall be taken by the Contractor to the satisfaction of Architect and Engineer within 30 days of receipt of the Architect/Engineer's punch list.

#### 1.10 Warranty

- A. Warrant all workmanship, equipment and material entering into this contract for a period of one (1) year from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during this warranty period shall be made good without expense to the Owner. Use of equipment for temporary system use is not the start of the warranty period.
  - 1. Certain items of equipment are specified to have multi-year parts and/or labor warranties. Refer to individual equipment specifications.

- B. This provision is intended specifically to cover deficiencies in contract completion or performance which are not immediately discovered after systems are placed in operation. Also included shall be supplementary assistance in balancing, adjusting or providing operating instructions as the need develops, and replacing overload heater elements in starters where necessary to keep systems in operation. Heater element sizes shall not exceed the motor manufacturer's recommendations.
- C. This provision shall not be construed to include maintenance items such as re-tightening or repacking glands, greasing, oiling, belt tightening and cleaning strainers after these have been done for final close-out.
- D. Provisions of this warranty shall be considered supplementary to warranty provisions under Division 01 General Conditions.

1.11 Project Close-Out

- A. The following schedule summarizes actions to be taken or submittals to be completed prior to issuance of the Contract Completion Certificates. Refer to Division 01 - General Requirements, and applicable paragraphs of this Section and the applicable trade Divisions for additional requirements. This information should be submitted at least thirty days in advance of request for final inspection. Where possible, the information shall be bound in 8.50 inches x 11 inches hard back binders.

ITEM	SPEC SECTION
1. Materials/Suppliers List	22 05 01
2. Record Drawings	22 05 01
3. Certificate of Inspection	22 05 01
4. Tests and Adjustments	22 05 01
5. Operating Instructions and Maintenance Manuals	22 05 01
6. Equipment and Piping Identification	22 05 53
7. Completed Punch List	22 05 01
8. Waiver of Liens	Div. 01
9. Affidavit of Wage Compliance	Div. 01
10. Change Orders and Allowance Adjustment	Div. 01

**PART 2 - PRODUCTS**

2.1 Materials and Equipment

- A. Materials and equipment furnished under this contract shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.

2.2 Listing and Labeling

All equipment and appliances shall be listed and labeled in accordance with the Plumbing Code. Testing shall be performed by an Approved Agency, with the seal or mark of the Agency affixed to each piece of equipment or appliance

2.3 Reference Standards

- A. Where standards (NFPA, NEC, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the authority having jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

#### 2.4 Shop Drawings

- A. Electronic copies of shop drawings and descriptive information of equipment and materials shall be furnished. Submit to the Architect and/or Engineer for review as stated in the General Conditions and Supplementary Conditions. These shall be submitted as soon as practicable and before equipment is installed and before special equipment is manufactured. Submittal information shall clearly identify the manufacturer, specific model number, approval labels, performance data, electrical characteristics, features, specified options and additional information sufficient to evidence compliance with the contract documents. Product catalogs, brochures, etc. submitted without project specific items marked as being submitted for review will be rejected and returned without review. Shop drawings for equipment, fixtures, devices and materials shall be labeled and identified same as on the Contract Documents. If compliance with the above criteria is not provided shop drawings will be subject to rejection and returned without review. Samples shall be submitted when requested or as specified here with-in.
- B. The review of shop drawings by the Architect or Engineer shall not relieve the Contractor from responsibility for errors in the shop drawings. Deviations from specifications and drawing requirements shall be called to the Engineer's attention in a separate clearly stated notification at the time of submittal for the Engineer's review.
- C. Shop drawings of the following Plumbing equipment and materials shall be submitted:
  - 1. Pipe, fittings and joining methods for the various systems.
  - 2. Pipe hangers and supports.
  - 3. Valves.
  - 4. Pipe insulation.
  - 5. Supply system specialties.
  - 6. Drainage system specialties.
  - 7. Sewage ejectors, basin and controls.
  - 8. Plumbing fixtures and trim.

### **PART 3 - EXECUTION**

#### 3.1 Pipe Testing

- A. All piping provided in this work shall be pressure tested, as specified below.
- B. Pipe testing for Plumbing piping shall be:
  - 1. Domestic cold and hot water piping - hydrostatic at 125 psig or 1.50 times the maximum operation pressure of the system, whichever is higher, for 6 hours at the low point of the system.
  - 2. Soil, waste and vent piping - rough test and final test, in conformance to Plumbing Code requirements.
- C. Testing shall be performed prior to application of insulation. Ensure that air is vented from piping when piping is hydrostatically tested.

- D. Tests shall be witnessed by field representatives of the Architect or Engineer or shall be monitored by a recorder. Furnish a written record of each piping system test indicating date, system, pressure, duration and results of tests. Copies of test reports shall be included in the O&M manuals.
- E. Leaks discovered during testing shall not be patched. Threaded connections shall be either tightened or replaced.
- F. Where a new pipe connects to an existing pipe, provide the following to facilitate testing, cleaning, draining and eventual shutoff service:
  - 1. A shutoff valve in the new pipe near the point of connection.
  - 2. A valved stub with brass plug downstream of the valve for testing of the new pipe extension. Close valve, remove handle after testing is complete. Wire handle to valve body.

### 3.2 Pipe Cleaning

- A. Before placing each water piping system in operation, the piping system shall be thoroughly flushed out with clean water. Remove, clean and replace all strainer screens once flushing is complete. On domestic water systems, remove, clean and replace all fixture mounted strainer screens and faucet aerators after fixtures are set and connected piping is flushed thru the fixtures.
- B. Refer to appropriate Sections for cleaning of other piping for normal operation.

### 3.3 Disinfection of Piping

- A. All new and any existing domestic water piping out of service for more than 14 days shall be disinfected by a company or personnel regularly engaged in the performance of this service.
- B. Keep new systems isolated from the existing systems until after disinfection is completed and proven acceptable by bacteriological test results. Provide a service cock at the point of connection for injection of the disinfecting agent. If it is necessary to use a potable water supply in the performance of the disinfection procedures, provide temporary reduced pressure zone back flow prevention until disinfection and analysis results are complete.
- C. Thoroughly flush the system, as previously described, prior to disinfection. Disinfection shall be performed in accordance with the Local Authorities prescribed method, or when a Local Authority prescribed method is not available, in accordance with AWWA C651 or AWWA C652 Standards. Disinfection shall be by means of a chlorine solution injected into the water system near the source. Each outlet shall be tested to prove presence of minimum chlorine concentration. Document that adequate levels of chlorine are present in all parts of the system. Following the appropriate retention period, flush out the system with clean water until the residual free chlorine content is equal to the level of the incoming water, but not greater than 1.5 parts per million or until approved by the Health Department.
- D. Perform a bacteriological analysis of the potable water system. One test sample shall be collected from the end of the main and one from each branch. Provide certification stating the name of the lab performing the testing, the job name, the date of the sample and results of the testing.
- E. Disinfection procedures shall be witnessed or approved by the Architect, Engineer or other qualified representative, who shall present the contractor with a letter or certificate of

completion. Copies of the certificate of completion and bacteriological analysis reports shall be included in the Operations and Maintenance Manuals.

#### 3.4 Operation and Adjustment of Equipment

- A. As each piping system is put into operation, all items of equipment included therein shall be adjusted to proper working order. This shall include balancing water systems, tightening packing glands, and adjusting all operating equipment.
- B. Caution: Verify that all bearings are lubricated, all motors are operating in the right direction, and correct drive settings and overload heater elements are provided on all motors. Do not depend wholly on the electrician's judgment in these matters. Follow specific instructions in regard to lubrication. Do not oil or grease presealed ball bearings unless upon manufacturer's specific instructions.
- C. Test relief valves, air vents and regulating valves to ensure proper operation.

#### 3.5 Operating Demonstration and Instructions

- A. Set the various systems into operation and demonstrate to the Owner and Architect that the systems function properly and that the requirements of the Contract are fulfilled.
- B. Provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems.
- C. O&M manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.

END OF SECTION



**22 05 02      AGREEMENT AND WAIVER FOR USE OF ELECTRONIC FILES**

**PART 1 - GENERAL**

- 1.1 The Engineer, at his sole discretion and without obligation, makes graphic portions of the contract documents available for use by the contractor in electronic format. These electronic files are proprietary, and remain the Engineer's Instruments of Service and shall be for use solely with respect to this project, as provided in the Standard Form of Agreement between Owner/Architect and Engineer.
- 1.2 Electronic files shall be released only after bids have been received for the project and contracts have been signed with the contractors.
- 1.3 The contractor shall acknowledge receipt of electronic files in the requested format for this project. The electronic files are provided as a convenience to the User, for use in preparing shop drawings and/or coordination drawings related to the construction of only the project identified in the Agreement. The electronic files and the information contained within are the property of the Engineer and/or the Architect and/or the Owner, and may not be reproduced or used in any format except in conjunction with the project identified in the Agreement.
- 1.4 The User acknowledges that the information provided in the electronic files is not a substitution or replacement for the Contract Documents and does not become a Contract Document. The User acknowledges that neither the Engineer, the Architect, the Consultants, the Client or the Owner make any warrant or representation that the information contained in the electronic files reflect the Contract Documents in their entirety. The User assumes full responsibility in the use of the electronic files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
- 1.5 The User acknowledges that the receipt of electronic files in no way relieves the User from the responsibility for the preparation of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
- 1.6 Electronic files are available in a .DWG or .RVT format for a cost as indicated in the Agreement and Waiver Form. **Providing the documents in a .DWG version that differs from the product version that the .DWG files were initially created in will incur additional charges per sheet, as indicated in the Agreement and Waiver Form.** Charges are for the Engineer's time to prepare the documents in the format stated. They are available through the Engineer's office on a C.O.D. basis only. A sample of the format will be provided by the Engineer upon request by the contractor, for the purpose of testing the compatibility of the format to the contractor's systems.
- 1.7 All drawings will be in an AutoCAD file format, when requested to be .DWG format.
- 1.8 All project models will be furnished without views.
- 1.9 All electronic files shall be stripped of the Project's name and address, the Architect's / and / Engineer's / and / any consultant's name and address, and any professional licenses indicated on the contract documents, (and all dimensions, verbiage, and statistical information). Use of these electronic files is solely at the contractor's risk, and shall in no way alter the contractor's Contract for Construction.
- 1.10 The User agrees to indemnify, hold harmless and defend the Engineer, the Architect, the Consultants, the Owner, the Client and any of their agents from any litigation resulting from the use of (by any means of reproduction or electronic media) these files. The Engineer makes no

representation regarding fitness for any particular purpose, or suitability for use with any software or hardware, and shall not be responsible or liable for errors, defects, inexactitudes, or anomalies in the data, information, or documents (including drawings and specifications) caused by the Engineer's or its consultant's computer software or hardware defects or errors; the Engineer's or its consultant's electronic or disk transmittal of data, information or documents; or the Engineer's or its consultant's reformatting or automated conversion of data, information or documents electronically or disk transmitted from the Engineer's consultants to the Engineer.

- 1.11 The contractor waives all claims against the Engineer, its employees, officers and consultants for any and all damages, losses, or expenses the contractor incurs from such defects or errors in the electronic files. Furthermore, the contractor shall indemnify, defend, and hold harmless the Engineer, and its consultants together with their respective employees and officers, harmless from and against any claims, suits, demands, causes of action, losses, damages or expenses (including all attorney's fees and litigation expenses) attributed to errors or defects in data, information or documents, including drawings and specifications, resulting from the contractor's distribution of electronic files to other contractors, persons, or entities.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

- 3.1 Attached "Agreement" shall be submitted with accompanying payment to the Engineer prior to delivery of electronic files.

END OF SECTION





**ELECTRONIC FILES  
HEAPY RELEASE FORM TO CONTRACTORS**

**22 05 02A  
ELECTRONIC FILES HEAPY RELEASE FORM TO CONTRACTORS**

**Project:** Sinclair Community College  
EMS Classroom-SIM LAB  
444 West Third St  
Dayton, OH 45402

**Owner:** Sinclair Community College

**Heapy Engineering Project Number:** 2024-06062

**Heapy Engineering Project Manager:** Nick Andrews

The Provider, named below, will furnish the Recipient, named below, certain documents prepared by the Provider or its sub consultants in an electronic format. These documents are hereinafter collectively referred to as "Electronic Files". The Electronic Files are instruments of the Provider services performed solely for the Owner's benefit and to be used solely for this Project. The Provider does not represent that the information contained in the Electronic Files are suitable for use on any other project or for any other purpose. If the Electronic Files are used for any other project or purpose without the Provider's specific written permission, the risk of such use shall be assumed solely by the Recipient or other user.

**Prior to the use of the Electronic Files the Provider and the Recipient agree to the following terms and conditions:**

1. The Provider and Recipient fully understand that the data contained in these electronic files are part of the Provider's Instruments of Service. The Provider shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.
2. The Recipient confirms their request to the Provider for Electronic Files for the Project listed above, which the Recipient understands are to be provided only in accordance with, and conditioned upon, the terms and conditions of the Agreement and Waiver for Use of Electronic Files).
3. The Provider agrees that the Recipient may use the Electronic Files for the sole purpose of preparing shop drawings and/or coordination drawings for the above Project only. Any Electronic Files provided are strictly for the use of the Recipient in regard to the Project named above, and shall not be utilized for any other purpose or provided by the Recipient to any entity other than its subcontractors for the Project named above.
4. The Recipient acknowledges that the furnishing of Electronic Files in no way relieves the Recipient from the responsibility of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
5. The Recipient acknowledges:

- a. That the Electronic Files do not contain all of the information of the Bid Documents or Contract Documents for the construction of the Project above.
  - b. That information in the Bid Documents or Contract Documents may be revised or modified in the future.
  - c. The Provider does not have, and will not have, any duty or obligation to advise or give notice to the Recipient of any such revisions or modifications.
  - d. That the Recipient agrees that its use of the Electronic Files is at the Recipient's sole risk of liability, and that the Recipient shall make no claim or demand of any kind against the Provider arising out of Recipient's receipt or use of the Electronic Files.
6. The Provider makes no representation or warranty of any kind, express or implied, with respect to the Electronic Files and specifically makes no warranty that the Electronic Files shall be merchantable or fit for any particular purpose, or accurate or complete. Furthermore, any description of said Electronic Files shall not be deemed to create an implied or express warranty that such Electronic Files shall conform to said description.
7. Due to the unsecured nature of the Electronic Files and the inability of the Provider or the Recipient to establish controls over their use, the Provider assumes no responsibility for any consequences arising out of the use of the data. It is the sole responsibility of the Recipient to check the validity of all information contained within the Electronic Files. The Recipient shall at all times refer to the Construction Documents of the project during all phases of the project. The Recipient shall assume all risks and liabilities resulting from the use of this data, and the Recipient agree(s) to waive any and all claims and liability against the Provider and its sub consultants resulting in any way from the use of the Electronic Files.
8. Electronic Files are provided strictly as a courtesy by the Provider solely for the convenience of the Recipient, and are not part of the Bid Documents or Contract Documents for the Project. The Electronic Files do not replace or supplement the paper copies of any drawings, specifications, or other documents included in the Contract Documents for use on the project.
- a. The Recipient assumes full responsibility in the use of Electronic Files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
9. As stated herein, the possibility exists that the Electronic Files provided may differ from the Bid Documents or Contract Documents for construction of the Project. The Provider shall not be responsible, nor be held responsible, for differences between Electronic Files, the Bid Documents, and Contract Documents. The Bid Documents or Contract Documents for the Project may be modified by the Provider at any time, either before or after construction begins. The Provider has no responsibility, either before or after any such modification, to determine or to advise the Recipient whether any such modification causes Electronic Files provided to the Recipient to be out of date, inconsistent with the Bid Documents or Contract Documents, or otherwise unsuitable or unfit for use in any way.
10. The Recipient assumes all risk and liability for any losses, damages, claims, or expenses (including defense and attorney fees) resulting from its receipt, use, or possession of Electronic Files furnished by the Provider. The Provider makes no representation, warranty or guarantee that the Electronic Files:
- a. Are suitable for any other usage or purpose.
  - b. Have any particular durability.
  - c. Will not damage or impair the Recipient's computer or software.

- d. Contain no errors or mechanical flaws or other discrepancies that may render them unsuitable for the purpose intended by the Recipient.
11. Recipient agrees to indemnify, defend and hold harmless the Provider, agents, employees, and the Owner from, and against, any and all claims, suits, losses, damages or costs, of any kind or nature, including attorney's fees, arising from or by reason of the Recipient's use of Electronic Files provided by the Provider, and such defense and indemnification obligation duties shall survive any use under this Agreement and Waiver for Use of Electronic Files.
12. The Recipient agrees that the Provider shall have no responsibility whatsoever for problems of any nature arising from transmitting and storing electronic files at a Recipient requested FTP or project management site or the conversion of the Electronic Files by the Recipient or others for use in non-native applications. The Provider will not provide Electronic Files in compressed formats. Recipient agrees to accept the files in the format provided by the Provider, and that Recipient's conversion or electronic file storage at the Recipient's requested site, shall be at Recipient's sole risk.
13. Recipient acknowledges:
- a. That the Electronic Files provided by the Provider are a graphical representation of the building in order to generate two-dimensional industry standard drawings.
  - b. That the data contained in the Electronic Files may not be 100% accurate and should not be used for dimensional control, building layout, shop drawings, or any other similar purpose
  - c. That any schedule of materials produced directly from the Electronic Files has not been checked for accuracy.
  - d. That the information in the Electronic Files should be used only for comparative purposes and shall not be relied upon for accurate quantity estimates or used in establishing pricing.
14. Electronic Files provided by the Provider will only contain elements and content that the Provider deems necessary and appropriate to share. No specific Level of Development (LOD) is implied or expected. The Recipient agrees that no proprietary content, MvParts or Revit Families or any other AutoCAD MEP or Revit MEP content shall be removed from the model and/or used for any other purpose but to support this specific project.
15. The Provider, at its sole discretion, may modify the Electronic files before they are provided to the Recipient. Such modifications may include, but are not necessarily limited to, removal of certain information. The Provider, at its sole discretion, may refuse to provide some or all Electronic Files requested by Recipient.
16. The availability of Electronic Files that were not prepared by the Provider is subject to the consent of the Owner or consultant that prepared those Electronic Files. The Provider will not negotiate with the Owner or consultant or repeatedly solicit the Owner or consultant to obtain such consent. Neither this Agreement and Waiver for Use of Electronic Files nor any such separate Consultant's consent may be assigned or transferred by Recipient to any other person or entity.

Provider (Name of Company): \_\_\_\_\_

Recipient (Name of Company): \_\_\_\_\_

Recipient Address: \_\_\_\_\_

Name of authorized Recipient Representative: \_\_\_\_\_

Title of authorized Recipient Representative: \_\_\_\_\_

E-mail address of authorized Recipient Representative: \_\_\_\_\_

Signature of authorized Recipient Representative: \_\_\_\_\_

Date: \_\_\_\_\_

NOTE: Select requested Electronic File Format, File Transfer Medium and complete applicable Cost Summary.

**A. Electronic File Format (select one):**

1.  .DWG Format - List of Drawings Requested: \_\_\_\_\_
2.  Revit Project Model Requested (Model only, no Views included)

**B. File Transfer Medium (select one):**

- CD-ROM     DVD-ROM     Heapy FTP     User's FTP site     Flash Drive

**C. Delivery of Electronic Files Cost Summary:**

Available Electronic .DWG file format:

- 2022 DWG

If a different file version is required than the indicated available version state the requested version:

\_\_\_\_\_ .DWG

**Note that an additional charge per sheet will be incurred.**

Cost of Preparation of Division 22 Electronic .DWG Files:

First Drawing: \$50.00 \$50.00

Additional Drawings \$15.00 each \_\_\_\_\_ x \$15.00 = \$ \_\_\_\_\_

Conversion to .DWG version different from available .DWG:  
\$5.00 additional/sheet \_\_\_\_\_ x \$ 5.00 = \$ \_\_\_\_\_

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_  
All files will be bound together.

Available electronic Revit file format:

- 2022 .RVT

Cost of Preparation of Division 22 Electronic Revit Model Files:

Revit Project Model without Views \$500.00

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_



**22 05 04 BASIC PLUMBING MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 Construction Water

- A. Refer to Division 01 - General Requirements, for information regarding construction water.
- B. Each Contractor requiring water for construction purposes shall connect to wall hydrants or other connection points within the existing building.

1.2 All piping, fittings, valves, solders, fluxes, appurtenances and other equipment in which wetted parts are in contact with water, installed in public drinking water systems and plumbing systems providing potable and/or drinking water for human consumption shall conform to the "Lead Free" requirements of NSF 61 and NSF/ANSI 372.

1.3 Continuity of Services

- A. Work shall be so planned and executed as to provide reasonably continuous service of existing systems throughout the construction period. Where necessary to disrupt services for short periods of time for connection, alteration or switch-over, the Owner shall be notified in advance and outages scheduled at the Owner's reasonable convenience.
- B. Submit, on request, a written step-by-step sequence of operations proposed to accomplish the work. The outline must include tentative dates, times of day for disruption, downtime and restoration of services. Submit the outline sufficiently in advance of the proposed work to allow the Architect or Engineer to review the information with the Owner. Upon approval, final planning and the work shall be done in close coordination with the Owner.
- C. Shutdown of systems and work undertaken during shutdown shall be bid as being done outside of normal working hours.
- D. Contractor shall be liable for financial reimbursement to the Owner for causing outages due to lack of proper coordination or not following coordination directions and/or instructions.

**PART 2 - PRODUCTS – Not Applicable**

**PART 3 - EXECUTION**

3.1 Workmanship

- A. Materials and equipment shall be installed and supported in a first-class and workmanlike manner by mechanics skilled in their particular trades. Workmanship shall be first-class in all respects, and the Architect and Engineer shall have the right to stop the work if highest quality workmanship is not maintained.
- B. Plumbing work shall be performed by licensed Plumbing Contractors in accordance with requirements of the jurisdiction.

3.2 Protection

- A. Each Contractor shall be entirely responsible for all material and equipment furnished in connection with their work. Special care shall be taken to properly protect all parts thereof from theft, damage or deterioration during the entire construction period in such a manner as

may be necessary, or as directed by the Architect. All piping and tubing shall be elevated from grade for on-site storage, and all open ends shall be covered. Plastic piping shall be protected from direct and indirect sunlight.

- B. The Owner's property and the property of other contractors shall be scrupulously respected at all times. Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

### 3.3 Cutting and Patching

- A. Refer to Division 01 - General Requirements for information regarding cutting and patching.
- B. Plan the work well ahead of the general construction. Where pipes are to pass thru new walls or partitions, place sleeves in these elements or arrange for the provision of openings where sleeves are not practical. Where sleeves or openings have not been installed, cut holes and patch as required for the installation of this work. Any damage caused to the building shall be repaired or rectified.
- C. Where pipes are to pass thru, above or behind existing walls or partitions patching and refinishing of same shall be provided. Core drilling and saw cutting shall be utilized where practical. Contractor to examine where walls, etc. are to be cut for presence of existing utilities.
- D. When cutting or core-drilling floor verify location of existing electrical, plumbing or steel reinforcement. Use X-ray method to verify existence of obstructions. Either re-route existing system, brace floor or alter location of new work to maintain existing system.
- E. All new and/or existing sleeves and openings not used or partially used shall be closed to prevent passage of smoke and fire.
- F. All materials, methods and procedures used in patching and refinishing shall be in accordance with applicable provisions of specifications governing the various trades, and shall be completed by skilled workmen normally engaged in these trades. The final appearance and integrity of the patched and refinished areas must meet the approval of the Architect. Wall, floor and ceiling refinishing must extend to logical termination lines (entire ceiling of the room repainted, for instance), if an acceptable appearance cannot be attained by finishing a partial area.

### 3.4 Removals, Alterations and Reuse

- A. Refer to the project documents for the scope of remodeling in the existing building.
- B. Cooperate with the General Contractor regarding all removal and remodeling work. Unless otherwise noted, remove all existing work which is associated with Division 22 and which will be superfluous when the new work is installed and made operational.
- C. Extraneous piping which is or becomes accessible shall be removed and stubs shall be capped at the first active pipe encountered. Piping that is and remains inaccessible shall be disconnected from active systems and abandoned. Ends of abandoned pipe shall be capped so as to be concealed by finished surfaces. Abandoned pipe shall be marked "Abandoned" at source and at terminus point. Upon completion of the work no abandoned pipe, valve or stub shall extend thru finished floors, walls or ceilings.



- D. When it is necessary to reroute a section of active piping the rerouted section shall be installed before removing the existing in order to minimize system down time. Rerouted sections shall be insulated as required for new work. Patch insulation on existing piping which has been damaged or removed in this work.
- E. Materials and equipment which are removed shall not be reused within the scope of this project unless specifically noted to be relocated or reused. Turn over to the Owner and place where directed on the premises all removed material and equipment so designated by the Owner. Where applicable, recycle metals and plastics and provide weight tickets. Include documentation in the O&M manuals. All material and equipment not claimed by the Owner shall become the property of the Contractor responsible for removal and shall be removed from the premises.
- F. Remove, store and reinstall lay-in ceiling tile and grid as needed to perform work in areas where such removal and re-installation is not to be done by the General Contractor. Damaged tile and/or grid shall be replaced with new matching tile and/or grid.
- G. In areas of minor work where the space is not completely vacated, temporarily move portable equipment and furnishings within the space as required to complete the work. Coordinate this activity with the Owner. Protect the Owner's property by providing dust covers and temporary plastic film barriers to contain dust. Remove barriers and return equipment and furniture upon completion of the work.
- H. Refinish any surface disturbed under this work to match existing, except where refinishing of that surface is included under the General Contract.

### 3.5 Painting

- A. In addition to any painting specified for various individual items of equipment, provide the following painting:
  - 1. Ferrous metal which is not factory or shop painted or galvanized and which remains exposed to view in the finished areas of the building and other unfinished areas shall be given a prime coat of paint and two finish coats of paint.
  - 2. Equipment and materials which have been factory or shop coated (prime or finished painted or galvanized), on which the finish has been damaged or has deteriorated, shall be cleaned and refinished equal to its original condition. The entire surface shall be repainted if a uniform appearance cannot be accomplished by touch up.
  - 3. Apply Z.R.C. Galviline cold galvanizing compound, or approved equal, for touch-up and repair of previously galvanized surfaces.
- B. Paint, surface preparation and application shall conform to applicable portions of the Painting section of Division 09 Specifications. All rust must be removed before application of paint.
- C. Provide finish painting only where specifically instructed. Refer to the Cutting and Patching paragraph in this Section for finishing requirements.

END OF SECTION



**22 05 05 FIRESTOPPING**

**PART 1 - GENERAL**

- 1.1 Firestopping assemblies shall be provided at penetrations of piping thru fire rated walls and partitions and fire rated shaft walls and partitions. Refer to the drawings for fire rated building elements and pipe layouts.
- 1.2 Firestopping assemblies shall be tested and rated in accordance with ASTM E814, E119 and listed in accordance with UL 1479, as published in the UL Fire Resistance Directory. Firestopping shall provide a fire rating equal to that of the construction being penetrated.
- 1.3 Firestopping materials, assemblies and installation shall conform to requirements of the OBC and the Authority Having Jurisdiction.
- 1.4 For those firestopping applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.5 Shop drawings shall be prepared and submitted for review and approval. Submittals shall include manufacturer's specifications and technical data of each material, documentation of UL firestopping assemblies and installation instructions. Submittals shall include all information required in the OBC.

**PART 2 - PRODUCTS**

- 2.1 Firestopping materials shall be manufactured and/or supplied by Hilti, 3M, Rectorseal-Metacaulk, Tremco, Nelson, Specified Technologies or other approved manufacturer.
- 2.2 Materials shall be in the form of caulk, putty, sealant, intumescent material, wrap strip, fire blocking, ceramic wool and other materials required for the UL listed assemblies. These shall be installed in conjunction with sleeves and materials for fill and damming.
- 2.3 Combination pre-set floor sleeve and firestopping assemblies shall be equal to Hilti CP 680.

**PART 3 - EXECUTION**

- 3.1 Installation of all materials and assemblies shall be in accordance with UL assembly drawings and the manufacturer's instructions.
- 3.2 Installation shall be done by an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary training and experience.
- 3.3 Refer to 22 05 07 Piping Materials and Methods for Plumbing for pipe sleeve requirements and treatment of penetrations not requiring firestopping.

END OF SECTION



## **22 05 07 PIPING MATERIALS AND METHODS**

### **PART 1 - GENERAL**

- 1.1 Piping materials and methods for piping common to Division 22 – Plumbing shall be as specified herein and as shown on the drawings.
- 1.2 All piping, fittings, valves, solders, fluxes, seals and appurtenances in which wetted parts are in contact with water, installed in public drinking water systems and plumbing systems providing potable and/or drinking water for human consumption shall conform to the “Lead Free” requirements of NSF 61, Annex G and NSF/ANSI 372.
- 1.3 Included in this section are:
  - A. Pipe, fittings and joining methods.
  - B. Unions.
  - C. Dielectric connectors.
  - D. Pipe sleeves, openings, curbing and escutcheons.
  - E. Installation methods of piping.
- 1.4 Refer to other Sections in Division 22 for selection of piping materials for the various services. Piping materials and installation methods peculiar to certain individual systems are specified in Sections related to those systems.
- 1.5 Refer to Section 22 05 05 Firestopping and Division 7 for firestopping requirements.
- 1.6 Pipe threads shall meet B1.20.1 for factory threaded pipe and pipe fittings.
- 1.7 Soldering procedures per ASTM B828 with flux per ASTM B813 and solder per ASTM B32.
- 1.8 Pipe sleeves and wall openings shall be provided as described below. Pipe sleeves shall be placed in all walls and partitions, except as noted below, to allow new piping to pass thru and to allow for expansion, contraction and normal movement of the pipe. Sleeves are also required for all existing piping related to this trade in new walls and partitions, same as for new piping.
- 1.9 Sleeves are not required:
  - A. In stud and gypsum board or plaster walls and partitions which are not fire rated.
  - B. For above grade uninsulated pipe passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions.
- 1.10 Where pipes penetrate walls other than those required to be fire rated, the annular space between the sleeve, core drilling or opening and the pipe or pipe insulation shall be closed to retard the passage of smoke.

### **PART 2 - PRODUCTS**

- 2.1 Copper tubing, conforming to ASTM B88, Standard Specification for Seamless Copper Water Tube and Fittings and Joints, shall be:

- A. Type C1  
Pipe - Type "L" seamless hard drawn copper tubing.  
Fittings – ASME B16.22 wrought copper or cast bronze, solder ends.  
Joints - soldered with lead-free tin alloy, 95-5 tin-antimony or silver-bearing tin in accordance with methods of ASTM B828 and equal to Harris "Stay-Brite", "Stay-Brite 8" or "Bridgit".
- 2.2 Unions and flanges shall be:
  - A. Unions on copper tubing, all bronze construction 150 lb., solder ends.
- 2.3 A dielectric connector shall be incorporated at each connection between ferrous and non-ferrous piping. Connectors shall be:
  - A. Dielectric coupling with non-conductive polymer liner, Victaulic Style 47, Gruvlok "Di-Lok" and Lochinvar Corp. "V-Line" Dielectric fitting on services 200 degrees and less, and pressures less than 300 psi.
- 2.4 Pipe sleeves shall be:
  - A. Schedule 40 black steel pipe, ASTM A53, Type E, Grade A or 18 gauge galvanized steel in poured concrete walls.
  - B. 26 gauge galvanized sheet steel or Schedule 40 black steel pipe in other than poured concrete.
- 2.5 Escutcheon plates shall be split-ring chromium plated pressed steel. Plates shall be sized to cover the surface penetration and sleeve. Plates shall be installed on exposed piping in finished rooms and areas where pipes penetrate walls, floors, ceilings or overhead structure.

### **PART 3 - EXECUTION**

- 3.1 Pipe and tubing shall be cut and fabricated to field measurements and run parallel to normal building lines. Pipe ends shall be cut square and ends reamed to remove burrs. The pipe interior shall be cleaned of foreign matter before erection of the pipe.
- 3.2 Piping shall be pitched for drainage. The low points shall be fitted with a 0.75 inch drain valve (with hose thread adapter if not piped to a floor drain) except that on piping 1.25 inches and smaller where a drain valve is not shown, a drain plug is acceptable.
- 3.3 Piping shall be installed consistent with good piping practice, run concealed wherever possible and located as to be protected from damage by freezing. Coordinate with other trades to attain a workmanlike installation.
- 3.4 Piping shall be supported as specified in Section 22 05 29 Hangers and Supports for Plumbing Piping. Pipe alignment in both the horizontal and vertical must be tightly maintained. Misalignment must be corrected to the satisfaction of the Engineer before insulation is applied and the system accepted.
- 3.5 Internals of sweat end valves shall be removed when damage or warping could occur due to applied heat of soldering.
- 3.6 Close open ends of piping during installation to keep interior of the pipe clean.

- 3.7 Piping shall not be run above electrical switchgear or panelboards, nor above the access space in the immediate vicinity of the equipment, in accordance with the NEC.
- 3.8 Unions shall be installed at pipe connections to fixtures and equipment and as required for erection purposes.
- 3.9 Length of wall sleeves shall be such that the sleeve ends are substantially flush with both sides of the wall or partition. Pipe sleeves shall be sized to allow insulation to pass thru the sleeve, for insulation requiring continuous vapor barrier (domestic cold water, chilled water, refrigerant, etc.). Where vapor barrier continuity is not needed, the sleeve may be sized to pass the pipe only or the insulation as well. Refer to the following paragraph for qualifications and exceptions relating to firestopping.
- 3.10 Refer to 22 05 05 Firestopping. Pipe sleeves which are a part of firestopping assemblies shall conform to the requirements of the assembly with particular emphasis regarding size, annular space, length, passage or non-passage of insulation and the installation of the sleeves.
- 3.11 In lieu of firestopping and where permitted by the OBC, uninsulated metallic pipes requiring no pipe sleeves in passing thru concrete floors or concrete or masonry walls or partitions, the annular space shall be closed full depth of the penetration with materials and methods compatible with the floor, wall or partition material (concrete, grout or mortar) in compliance with ASTM E 119 test requirements.
- 3.12 Where firestopping is not required, the annular space between the sleeve, core drilling or opening and the pipe or pipe insulation shall be closed with sealant or caulking to retard the passage of noise or smoke. Sealant or caulking shall be applied per the manufacturer's requirements, including opening width limitations, backing materials, sealant or caulking thickness, etc. Sealants and caulking shall be compatible with the materials they are in contact with, and sealants and caulking in direct contact with copper piping shall be silicon-based to minimize the potential for corrosion.

END OF SECTION





**22 05 09 EXCAVATION, BACKFILL AND SURFACE RESTORATION**

**PART 1 - GENERAL**

- 1.1 Excavate for all in-grade underfloor piping and associated incidental work. Cut existing floor slabs and replace slabs in conformance to 22 05 04 Basic Plumbing Materials and Methods.
- 1.2 Excavation and trench wall supporting, cribbing, sloping and stepping of excavations required for safety shall be done in accordance with OSHA and local requirements. Pumping of water from excavations and trenches which may be required during construction shall be included in this contract.
- 1.3 A utility locator service shall be provided to locate, mark and identify private lines and other utilities that are not located by the means mentioned above.
- 1.4 Existing utilities encountered during excavation work shall be protected in a manner acceptable to the utility owner. Any utilities that are damaged shall be repaired or replaced by this Contractor to the full satisfaction of the utility owner.

**PART 2 - PRODUCTS**

- 2.1 Refer to Division 31 Earthwork for bedding and backfill materials specifications.

**PART 3 - EXECUTION**

- 3.1 Trenches for interior and exterior piping shall be over excavated and the pipe shall be laid on 6 inches minimum depth sand bed.
- 3.2 Backfilling and compaction of excavations and trenches inside the building shall be with approved backfill materials, to prevent undue settlement. Backfill material for plastic piping shall be pea gravel or sand.
- 3.3 Backfill shall be mechanically compacted in layers not over 6 inches deep. Water settling will not be permitted. Where excavations have not been properly filled or where settlement occurs, they shall be refilled, compacted, smoothed off, and finally made to conform to the initial requirements. Excess excavated materials shall be removed from the site or disposed of.
- 3.4 Plastic piping for sewers and drain shall be installed in compliance with ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-flow Applications.
- 3.5 Concrete floor slabs which have been damaged or removed in order to install the underground work shall be replaced by this Contractor equal to original conditions.
- 3.6 Maintain in place adequate barricades, guards, planking, plating, signage, warning lights, etc., at and around excavations.

END OF SECTION



## **22 05 23 GENERAL DUTY VALVES FOR PLUMBING PIPING**

### **PART 1 - GENERAL**

- 1.1 Refer to Section 22 11 16 Interior Domestic Water Piping and Section 22 11 19 Interior Domestic Water Piping Specialties for selection of valves for the various services. Valves peculiar to individual systems are referenced or specified in Sections related to those systems.
- 1.2 Valves and materials shall comply with applicable standards and specification of ANSI, ASTM, ASME and MSS. Working pressure and temperature ratings of each valve shall exceed those imposed by the service in which it is applied.
  - A. ASTM B584 and ASTM B61 Copper Alloy Sand Casting for General Applications.
  - B. ASME B16.34, MSS SP-110 Ball Valves Threaded, Socket-Welded, Solder Joint.
  - C. Bronze (brass) valves installed in drinking water systems made with copper silicon alloy shall contain less than 22 percent zinc, and made with copper bismuth alloy less than 4 percent zinc. Bronze (brass) valves installed in non-drinking water systems shall contain less than 15 percent zinc.
- 1.3 All piping, fittings, valves, solders, fluxes, seals, fixtures, appurtenances and other equipment in which wetted parts are in contact with water, installed in public drinking water systems and plumbing systems providing potable and/or drinking water for human consumption shall conform to the "Lead Free" requirements of NSF 61 and NSF/ANSI 372.

### **PART 2 - PRODUCTS**

- 2.1 Valves installed in potable and drinking water systems shall be:
  - A. Ball Valves – NIBCO, Apollo, Watts
    1. Type B1. 2 inches and smaller.  
NIBCO T 585-66-LF, 150 s.w.p., 600 w.o.g., two piece bronze body, ASTM B584 screwed ends, full port, stainless steel ball and stem, packing nut with adjustable stem packing, TFE seat and seal, handle.
- 2.2 Sweat end valves of equal construction and features are acceptable in lieu of those specified with screwed ends.
- 2.3 Ball valves in piping which is to be insulated shall have extended shaft necks to accommodate the insulation.

### **PART 3 - EXECUTION**

- 3.1 Internals shall be removed and the remaining elements of sweat end valves shall be protected against heat damage during soldering or brazing.
- 3.2 Valves shall be installed with the stem at or above the centerline of the pipe. Valves shall be located to be accessible for operation, servicing and/or removal.
- 3.3 Packing glands shall be tightened before placing the valves in service.

END OF SECTION



## 22 05 29 HANGERS AND SUPPORTS FOR PLUMBING PIPING

### PART 1 - GENERAL

- 1.1 All interior piping shall be supported from the building structure.
- 1.2 All products and assemblies installed with-in a plenum shall not exceed a maximum flame spread of 25 and a smoke development of 50 as established by UL 723 or ASTM E84 test methods. However, "discrete" combustible components as defined by the mechanical code may be UL 2043 listed in lieu of UL 723 or ASTM E84.

### PART 2 - PRODUCTS

- 2.1 Manufacturers listed below are basis of design. Other applicable manufacturers are B-line, Erico, Fee, Mason, PHD and TOLCO.
- 2.2 Hangers and supports for horizontal piping shall be equal to:
  - A. General service - clevis type Anvil Fig. 260.
  - B. Uninsulated copper tubing - copper plated clevis type - Anvil Fig. CT-65 (or plastic coated clevis).
- 2.3 Hanger rods shall be solid steel, threaded end or all thread rod, of diameter listed below. A hanger attachment device (beam clamps, concrete inserts, etc.) and locking nuts at the hanger attachment shall be provided on each hanger. Locking nuts shall be provided at each clevis and trapeze type hanger.

<u>Pipe Sizes</u>	<u>Min. Rod Dia.</u>
2" and smaller	0.375"
2.5" to 3"	0.50"

- 2.4 Where the length of the hanger rod between the top of the hanger and the attachment device is 3 inches or less, clevis type hangers with rollers, Anvil Fig. 181, shall be used to allow for expansion travel.
- 2.5 Hanger rod attachment devices for attachment to the structure shall be:
  - A. After-set steel expansion type concrete inserts.
  - B. Multi-purpose rod hanger for structural purlins equal to Erico Caddy Model #PH, Fig. #2 for pipe sizes up to 3 inches.
- 2.6 Trapeze hangers for numerous pipes run in parallel may be utilized. Horizontal support members shall be unistrut type section with pipe rollers (to allow for expansion travel) and spring and nut connectors, suspended with hanger rods and attachments similar to individual pipe hanger suspension. Piping 1" and smaller and specified to be insulated with elastomeric type insulation may utilize Anvil's 25/50 flame/smoke rated Klo-Shure strut-mounted TPO plastic insulation couplings with steel strut clamp. Insulation wall thickness shall be 0.75" thickness. Transition to required service insulation thickness within 2" of either side of coupling.

- 2.7 Hangers on insulated horizontal piping shall be oversized to surround the pipe insulation. To protect the insulation from damage or inordinate compression due to concentrated weight, provide sheet metal shields and insulation inserts as specified in 22 07 19 Plumbing Piping Insulation.
- 2.8 Insulation shields shall be compatible with pipe insulation materials and thicknesses. Vapor barrier shall be continuous.
- 2.9 Coordinate the items above during the bidding period and determine, consistent with industry practice, the selection, furnishing and installation of the needed components.

### **PART 3 - EXECUTION**

- 3.1 Spacing of hangers and supports shall be as follows; unless otherwise shown on drawings:
  - A. Copper tubing (vertical) - at the base, at each floor level; and 10 ft. maximum spacing.
  - B. Copper tubing (horizontal) - 6 ft. spacing for tubing 1.25 inches size and smaller, 8 ft. spacing for 1.50 inches thru 2.5 inches sizes, 10 ft. spacing for tubing 3 inches size and larger.
  - C. Cast iron pipe (vertical) - at the base and at each floor (15 ft. maximum spacing).
  - D. Cast iron pipe (horizontal) - at each fitting and at each joint on straight lengths, 10 ft. maximum spacing.
  - E. Plastic Pipe - spacing and hanging methods in strict accordance with code requirements and manufacturer's recommendations, with consideration being given to service temperature and expansion compensation, but no greater than 4 feet spacing for horizontal and no greater than 10 feet spacing for vertical piping (with midstory guide).
- 3.2 Attachment of pipe hangers to the structure shall be with:
  - A. After-set concrete inserts, in 4 inches minimum depth concrete, set in drilled holes. Powder actuated driven fasteners are not permitted.
  - B. Unistrut type channel support system may be utilized where a number of pipes are run parallel or to span below other utilities and equipment. Channel shall be pre-set or attached to the structure with inserts or clamps.
  - C. Attachment to manufactured trusses and other engineered structural members and supports shall be done in strict accordance with the structural manufacturers recommendations. Refer to the architectural and structural drawings for type of engineered structural systems being used. Connections to these structural members shall be made with connection devices and methods approved by the structural manufacturer. Provide additional supports with supplemental steel shapes when spacing between structural members exceeds specified distances.
- 3.3 Pipe hangers shall be adjusted to proper elevation, hanger rods set in a vertical position and locking nuts secured before pipe insulation is installed.
- 3.4 Do not bend hanger rod to set in vertical position. Use manufactured hanger rod attachments that swivel to allow the hanger rods to hang vertically, or provide supplemental steel attached to the building structure and standard hanger rod attachments to allow the hanger rods to hang vertically. Refer to the following Manufacturers Standardization Society (MSS) Standard practices on pipe hangers and supports:

- A. MSS SP-58 on Materials, Design and Manufacturer
- B. MSS SP-69 on Selection and Application
- C. MSS SP-89 on Fabrication and Installation Practices

END OF SECTION





## **22 05 53 IDENTIFICATION OF PLUMBING PIPING AND EQUIPMENT**

### **PART 1 - GENERAL**

- 1.1 Identification of plumbing equipment shall consist of equipment labeling, pipe marking and valve tagging as specified hereinafter.
- 1.2 Pipe markings shall be applied to all piping.
- 1.3 Each shutoff valve, other than at equipment, shall be identified with a stamped tag. Valves and tagging shall be scheduled typewritten on 8.50 inches x 11 inches paper, tabulating valve number, piping system, system abbreviation, location of valve (room or area) and service (e.g. - south wing cold water).
- 1.4 Labels, tags and markers shall comply with ANSI A13.1 for lettering size, colors and length of color field.
- 1.5 Coordinate pipe markings and valve tags to ensure similar markings.

### **PART 2 - PRODUCTS**

- 2.1 Pipe markings shall be:
  - A. Plastic semi-rigid snap-on type, manufacturer's standard pre-printed color coded pipe markers extending fully around the pipe and insulation or pressure-sensitive vinyl markers similar to the above.
  - B. Arrows for direction of flow provided integral with the pipe marker or separate at each marker.
- 2.2 Valve tags shall be polished brass or plastic laminate with solid brass S hook. Tags shall be engraved with "P" (for plumbing) and the designated number.
- 2.3 Labels, markings and tags shall be manufactured by W.H. Brady, Seton, Allen, Kolbi, MSI or Industrial Safety Supply.

### **PART 3 - EXECUTION**

- 3.1 Identification labeling, marking and tagging shall be applied after insulation and painting has been completed.
- 3.2 Coordinate names, abbreviations and other designations used in Division 22 identification work, with corresponding designations shown, specified or scheduled on drawings.
- 3.3 The Division 22 and 23 labeling, marking and tagging shall be coordinated and consistent systems of identification.
- 3.4 Equipment labeling shall consist of unit designation as shown on the drawings.
- 3.5 Pipe markers shall be placed:
  - A. At 25 ft. centers in mechanical rooms and concealed spaces.
  - B. At 50 ft. centers in exposed finished area locations.

- C. On mains at each branch take-off.
  - D. At least once in each room.
- 3.6 Valve tags shall be placed on each valve except those intended for isolation of individual items of equipment. Valve tag schedules shall be prepared as specified above. Copies of one set of schedules shall be laminated in clear plastic and placed where directed by the Owner. Other sets shall be included in the Operating and Maintenance Manuals.

END OF SECTION

**22 07 19 PLUMBING PIPING INSULATION**

**PART 1 - GENERAL**

- 1.1 Piping systems shall be insulated as described below.
- 1.2 Composite insulation assemblies shall not exceed maximum flame spread of 25 and smoke development of 50, except as specifically allowed below, as established by UL 723 or ASTM E84 test methods. However, “discrete” combustible components as defined by the mechanical code may be UL 243 listed in lieu of UL 8723 or ASTM E84.
- 1.3 Insulation thicknesses are based on ASHRAE 90.1 and an average thermal conductivity of 0.22 to 0.28 BTU-in./hr. ft.2 - degrees F at 100 degrees F (0.21 to 0.27 BTU-in/hr ft<sup>2</sup> – degrees F at 75 degrees F). Thickness of insulation with lower conductivity may be reduced proportionately except that minimum thickness shall be 0.50 inch.
- 1.4 The following plumbing piping shall be covered with insulation of thickness listed, in compliance with ASHRAE 90.1, latest publication:

Pipe System	0.75" and smaller	1.0" to 1.25"	1.50" to 3"	4" to 6"	8" and larger
Domestic cold water	0.50"	0.50"	1"	1"	1"
Domestic hot water (≤140°F)	1"	1"	1.50"	1.50"	1.50"

- 1.5 Insulation on plumbing systems is to be omitted on the following:
  - A. Unions in domestic hot water piping systems.
  - B. Exposed plumbing fixture supplies and supply stops except where required to meet ADA requirements.
- 1.6 Submittals
  - A. Submit product description, thermal characteristics and list of materials and thickness for each service and location.
  - B. Submit manufacturers published literature indicating proper installation procedures.
- 1.7 Delivery, Storage and Handling
  - A. Materials on site shall be stored in original factory packaging, labeled with manufacturer’s identification, including product density and thickness.
  - B. Protect insulation from weather and construction traffic, dirt, water, chemical and damage in addition to storing in original wrapping.

**PART 2 - PRODUCTS**

- 2.1 Fiberglass insulation shall be manufactured by Johns Manville, Owens-Corning, Knauf or Manson. Closed-cell elastomeric insulation shall be manufactured by Armacell, K-Flex USA “Insul-Tube” or Aeroflex USA “Aerocel-SSPT”. Refer to paragraphs below for manufactures of specific restricted use insulations.

- 2.2 Fiberglass pipe insulation shall be factory molded tubular fiberglass with "all service" jacket having an integral vapor barrier. Longitudinal joints of the jacket shall be overlapping with factory applied adhesive. In lieu of the factory adhesive, staples on 6 inch centers may be used with vapor barrier mastic applied to seal both the joint and staple holes. Butt joints shall be sealed with 3 inches wide ASJ pressure sensitive tape. Insulation shall be GreenGuard certified for low formaldehyde and VOC emissions.
- 2.3 Fittings, valves, flanges and other devices, both exposed and concealed, requiring insulation shall be covered same thickness as pipe insulation with:
- A. For fiberglass insulation systems:
1. Factory molded fitting insulation cover with PVC one-piece fitting cover;
  2. Miter-cut segments of pipe insulation, held in place with adhesive and/or wire, filled with insulating cement smoothed to shape and covered with PVC one-piece fitting cover;
  3. Fiberglass blanket insulation, compressed, held in place and covered with PVC one-piece fitting cover; or
  4. Oversized pipe insulation, where applicable, finished same as straight run pipe insulation.
- 2.4 Hangers on insulated horizontal piping are to be oversized to surround the pipe insulation. To protect the insulation from damage or inordinate compression due to concentrated weight, the following shall be provided at each hanger:
- A. Pipe 2 inches and smaller - Anvil Fig. 168 18 ga. sheet metal rib-lock shield with belled ends, 12 inches long.
- 2.5 Insulation shields shall be compatible with pipe insulation materials and thicknesses. Vapor barrier shall be continuous.

### **PART 3 - EXECUTION**

#### **3.1 Site Inspection**

- A. Before starting work, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of insulation materials and accessories can begin.
- B. Verify that all insulation materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all insulation materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

#### **3.2 Preparation**

- A. Ensure that all surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty or damaged insulation shall not be acceptable for installation.

- C. Ensure that pressure testing of piping and fittings has been completed prior to installation.

### 3.3 Installation

- A. Installation shall be done by tradesman specializing in insulation work in strict accordance with manufacturers' recommendations. Installers shall be factory trained and certified for the insulation systems being installed. Submit credentials upon request.
- B. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices.
- C. Overlap and seal all longitudinal joints. Staples and adhesive may be used as stated above. Tape and seal cross joints. Vapor barrier shall be continuous on insulation of all cold services. Vapor barrier type mastic shall be used where needed to maintain a vapor seal, including over staples.
- D. Where insulation is terminated, insulation shall be beveled at 45 degrees and the beveled surface sealed with vapor barrier mastic, except in cellular glass systems. PVC caps over straight cut ends which have been vapor sealed may be used in lieu of beveling.

### 3.4 Protection

- A. Advise as to the requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.
- B. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

### 3.5 Safety Precautions

- A. Employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials and shall include (but not be limited to) disposable dust respirators, gloves, hard hats and eye protection.
- B. Conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

- 3.6 Reinsulate piping to match where existing insulation has been damaged or removed in the performance of work in this project.

END OF SECTION



**22 11 16 INTERIOR DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

- 1.1 Piping, valves and associated devices and materials for interior domestic cold water and hot water systems shall be provided as shown on the drawings and as specified.
- 1.2 Refer to Section 22 05 07 - Piping Materials and Methods for Plumbing, Section 22 05 23 – General Duty Valves for Plumbing Piping, Section 22 05 29 Hangers and Supports for Plumbing Piping and other related sections for required provisions.
- 1.3 All piping, fittings, valves, solders, fluxes, seals, appurtenances and other equipment in which wetted parts are in contact with water, installed in public drinking water systems and plumbing systems providing potable and/or drinking water for human consumption shall conform to the “Lead Free” requirements of NSF 61, Annex G and NSF/ANSI 372.

**PART 2 - PRODUCTS**

- 2.1 Water piping and associated devices, materials and accessories shall be as described in Section 22 05 07 Piping Materials and Methods for Plumbing. Piping shall be:
  - A. All piping 4 inches and smaller unless specifically noted below - Type C1.
  - B. Pipe nipples extending out of the wall to connect fixtures - brass with screwed ends. Exposed piping shall be chrome plated.
- 2.2 Valves for the various services shall be as listed below and as described in Section 22 05 23 General Duty Valves for Plumbing Piping.
  - A. Shutoff
    1. Ball B1

**PART 3 - EXECUTION**

- 3.1 Installation shall conform to provisions in Section 22 05 07 Piping Materials and Methods for Plumbing and Section 22 05 29 Hangers and Supports for Plumbing Piping.
- 3.2 Supply piping and supply stops exposed to view in the lab shall be chrome plated. Insulation is to be omitted.

END OF SECTION





## **22 13 16 INTERIOR DRAINAGE AND VENT SYSTEMS**

### **PART 1 - GENERAL**

- 1.1 Interior drainage and vent systems including soil, waste and vent system shall be provided as shown on the drawings and as specified.
- 1.2 Refer to 22 05 07 Piping Materials and Methods for Plumbing, 22 05 29 Hangers and Supports for Plumbing Piping and other related sections for provisions affecting this Section.
- 1.3 All referenced standards shall be of the latest edition adopted by the jurisdiction unless specifically noted otherwise.
- 1.4 All cast iron drainage and vent pipe, fittings and joining materials shall be listed to the respective standard(s) stated below, and shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute.

### **PART 2 - PRODUCTS**

- 2.1 Interior soil, waste and vent piping.
  - A. Pipe in grade below the floor slab shall be:
    1. Schedule 40 PVC solid core, ASTM D2665. Fittings shall be drainage type, ASTM D2665. Joints shall be solvent welded ASTM D 2564. Primer shall meet ASTM F656.
  - B. Pipe, fittings and joints above grade shall be:
    1. Pipe shall be coated cast iron, centrifugally cast with hubless ends, ASTM A-888 and CISPI 301. Fittings shall be drainage type with hubless ends. Joints shall be made with no-hub couplings consisting of a neoprene gasket, ASTM C564, Series 300 stainless steel shield and stainless steel band, CISPI 310, NSF certified and marked.
    2. Schedule 40 PVC pipe, ASTM 2665. Fittings shall be drainage type with socket ends. Joints shall be solvent welded. PVC piping shall not be installed in air plenums.
    3. Threaded nipples for fixture drain stub-outs shall be Schedule 40 PVC or copper, as specified above, with threaded adapters. Black or galvanized steel pipe is not permitted.

### **PART 3 - EXECUTION**

- 3.1 Cut pipe to required length and ream ends to remove burrs. Align horizontal piping to attain even pitch, minimum of 0.25 inch per ft. on sizes 2.50 inches and smaller, 0.125 inch per ft. on sizes 3 inches and larger unless specifically noted on drawings.
- 3.2 Piping shall not be run above electrical switchgear or panelboards, nor above access space in the immediate vicinity of the equipment, in accordance with N.E.C. Article 110.26.
- 3.3 The use of sealers or sealants for couplings in No-Hub cast iron systems is not acceptable unless specifically recommended by the coupling manufacturer. No-Hub type couplings shall be installed in strict conformance with manufacturer's recommendations.
- 3.4 Piping in air plenums shall not exceed maximum flame spread of 25 and smoke development of 50 as established by NFPA 255 test methods.

- 3.5 Provide hangers on plastic piping at closer spacing than that for metal piping, in accordance with manufacturers recommendations. Plastic piping systems shall be installed in strict conformance with manufacturer's latest installation instructions.

END OF SECTION

**22 13 19 DRAINAGE SYSTEMS SPECIALTIES**

**PART 1 - GENERAL**

1.1 Drainage systems specialties shall be as shown on the drawings and as specified.

**PART 2 - PRODUCTS**

2.1 Floor drains shall be as shown and scheduled on the drawings. Drains shall be equal to listed catalog numbers, type, size, materials and features. Drains shall be manufactured by J.R. Smith, Sioux Chief, Wade, Josam, Watts, Mifab or Zurn.

A. Floor drain traps shall be same material as the connecting piping.

2.2 Cleanouts

A. Cleanouts shall be of the same manufacturer as floor and roof drains and equal to the listed catalog numbers in type, materials and features.

B. Cleanouts located in floors shall be J.R. Smith Series 4020 consisting of two-piece adjustable housing, ABS, cast iron or bronze NPT gasketed plug and round non-slip nickel-bronze cover with securing screw. Additional features such as clamping device for waterproof membrane, synthetic covering top, heavy duty top, carpet flange or carpet marker shall be provided as appropriate for the installation.

C. Refer to Part 3 for installation and concrete anchorage of exterior cleanout covers at grade.

**PART 3 - EXECUTION**

3.1 Floor drains shall be set with rim below finish floor level to permit continuous floor pitch to drain, unless otherwise noted or directed. Verify exact location and desired rim elevations before installation.

3.2 Cleanouts shall be same size as pipe thru 4 inch size. Maximum size of cleanouts shall be 4 inches diameter unless larger units are required for testing or special access purposes. Provide cleanouts where indicated on the drawings and at other locations where deemed advisable. Location of cleanouts as stipulated by applicable code shall be considered as the minimum requirement.

END OF SECTION



**22 13 29 PLUMBING PUMPS - DRAINAGE**

**PART 1 - GENERAL**

- 1.1 Drainage pumps, basins and associated controls shall be provided as shown on the drawings and as specified.
- 1.2 Except where noted, basins covers, accessories and controls shall be furnished with the pump by the pump supplier.
- 1.3 Refer to Section 22 05 07 Piping Material and Methods, Section 22 05 09 Excavation, Backfill and Surface Restoration, Section 22 05 23 General Duty Valves, and other sections for work related to this section.

**PART 2 - PRODUCTS**

- 2.1 Sewage Ejectors - Zoeller, Weil, Crane, Hydromatic or Liberty
  - A. Type B1 - Submersible – Simplex - 2 HP and smaller
    1. Pump to be non-automatic submersible type, UL listed. Pump construction shall be all ASTM Class 25 cast iron. Motor and pump housing, shall be constructed of ASTM Class 25 cast iron with a cast iron base. Impeller shall be non-clogging vortex design constructed of cast iron. Shaft seal shall be ceramic-carbon type. All exposed fasteners shall be 300 Series stainless steel along with lift handle and pump removal/lift cable. Motor shall be permanent split capacitor type with automatic reset thermal overloads and permanently lubricated motor bearings. Motor housing shall be finned for extra cooling capacity. Motor shall be equipped with an UL Listed 3 wire cord and plug of sufficient length to allow connection to a receptacle. Pump shall be capable of passing 2 inch solids, maximum 130 degrees F. sewage discharge temperature with a 2 inch threaded discharge connection.
    2. Provide a piggyback variable level float switch as provided by the pump supplier for control of the sewage pump.
    3. Provide an alarm with horn and light to indicate high water condition. Alarm control panel shall include contacts for remote alarm annunciation. Alarm panel shall be NEMA 4x construction and include a float switch with 15' cable.
- 2.2 Pump discharge piping from pump discharge port, through valves, to termination or connection point at sanitary and/or storm mains shall be:
  - A. Type "L" or "M" hard copper tubing, ASTM B-88. Fittings shall be DWV drainage type with socket ends. Joints shall be soldered or brazed with lead-free alloy, 95-5 tin-antimony or tin-silver equal to Harris "Stay-Brite", "Stay-Brite 8" or "Bridgit". Solder shall meet ASTM B32.
  - B. Schedule 40 PVC pipe, ASTM 2665. Fittings shall be drainage type with socket ends. Joints shall be solvent welded. PVC piping shall not be installed in ceiling air plenums.
- 2.3 Basins and Covers
  - A. Basins to accommodate pumps shall be any one of the several following type, subject to conditions stated under each type. Refer to the drawings for minimum basin size required and inlet and vent connections.

1. TYPE C1

Fiberglass basin shall be constructed of commercial grade polyester with reinforcing material of commercial grade fiber (continuous strand or continuous mat) and a coupling agent to bond the glass reinforcement and resin. The basin shall be designed to withstand buckling and wall collapse two times the assumed loading at the depth of the basin as indicated on the drawings. Basin shall include anti-floatation and top flanges with Series 300 stainless steel inserts that are all fully encapsulated with non-continuous or chopped-strand glass strand reinforcement. Finished basin shall meet Barcol hardness of at least 90 percent of the resin manufacturer's specified hardness for the fully cured resin. The Barcol hardness shall be the same for both the interior and exterior surfaces. Cover shall be minimum 0.25 inch thick epoxy coated steel for pump removal and inspection, and flanged openings for vent piping, discharge piping and wiring, all sealed gas tight (gas tight seals are not required for open sump pumps). Cover shall be furnished with Series 300 stainless steel bolts and washers minimum 0.25 inch diameter for all access openings and for cover attachment to basin.

- 2.4 Refer to Section 22 05 23 for shutoff and check valves for the discharge piping of sewage ejector pump. Valves may be provided by the pump manufacturer.
- 2.5 Conduit from control panel to sump shall be per 26 05 33 – Raceways and Boxes for Electrical Systems.

**PART 3 - EXECUTION**

- 3.1 Ensure that sump inlet is sufficiently low to accommodate all flow inlets at not less than 0.125 inch per ft. slope. Ensure that electrical is accommodated under floor to sump pumps. Ensure head room for pump removal; offset piping connections and locate unions in a manner to accommodate disconnect and lifting of pumps.
- 3.2 Install a check valve on pump discharge, downstream, from disconnecting union or flange. Vent all sewage ejector sumps. Check valves shall be installed in the horizontal plane.
- 3.3 Drill a 0.1875 inch vent hole in discharge pipe, within the basin, between pump and check valve.
- 3.4 Install the "pump off" float above lowest pump intake (to eliminate possibility of air entering pump).
- 3.5 Provide all field wiring between alarm panel, control floats and pump . Provide cord conduit seals at cover interface.
- 3.6 Provide factory authorized start-up service for pump installation.

END OF SECTION

**22 42 00 PLUMBING FIXTURES**

**PART 1 - GENERAL**

- 1.1 Plumbing fixtures installed in place complete with supports, supply and waste trim shall be provided as shown on the drawings and as specified.
- 1.2 Refer to Division 7 for submittal, qualification, storage, handling warranty and installation requirements for joint sealants. Shop drawings shall be submitted to the Architect / Engineer for review and approval.
- 1.3 All plumbing fixtures, equipment and trim shall meet the dimensional and performance requirements of the ANSI, ARI, ASME, ASSE and/or CSA standards listed in the current jurisdictional plumbing code.
- 1.4 All piping, fittings, valves, solders, fluxes, seals, fixtures, appurtenances and other equipment in which wetted parts are in contact with water, installed in public drinking water systems and plumbing systems providing potable and/or drinking water for human consumption shall conform to the "Lead Free" requirements of NSF 61 and NSF/ANSI 372.

**PART 2 - PRODUCTS**

- 2.1 Fixtures and Trim:
  - A. Refer to schedule on the drawings for fixture specifications, including supply and waste trim where required. The schedule lists catalog numbers of various manufacturers. These catalog numbers are for the purpose of comparison to establish the construction material, quality and features of the fixtures and their components. Fixtures of equal quality by manufacturers listed in each category will be acceptable.
  - B. Fixture supply trim shall be of non-ferrous construction and supplies to each fixture shall be individually valved. Valves, supplies and escutcheons shall be furnished with the fixture supply trim.
  - C. Where exposed to view, all waste trim and supply trim shall be brass chrome plated furnished with wall escutcheons.
  - D. Screwed nipples serving fixtures from copper tube supply system shall be solid brass to avoid electrolytic corrosion. Exposed nipples shall be chrome plated.

**PART 3 - EXECUTION**

- 3.1 Installation
  - A. Space fixtures and rough-in carefully. Fixtures shall be carefully assembled and connected to the required plumbing outlets so the equipment will be ready for use when work is completed.
  - B. Secure supply and waste piping in chases and walls to preclude loose and ill-fitting pipes thru wall. Drop ear ell fittings shall be utilized at all supply nipples.
  - C. After installation of the fixtures is completed, all connecting pipes shall be flushed out through the fixtures to eliminate scale, and all valves shall be properly adjusted and fixtures left complete and ready for use. All fixtures shall be cleaned immediately prior to acceptance by the Owner.

END OF SECTION



## **23 05 01 BASIC HVAC REQUIREMENTS**

### **PART 1 - GENERAL**

#### 1.1 Special Note

- A. All provisions of the Bidding Requirements, General Conditions, and Supplementary Conditions, including Divisions 00 and 01, apply to work specified in this Division.
- B. The scope of the Division 23 work includes furnishing, installing, testing and warranty of all work and complete HVAC systems as shown on the H series drawings, and as specified in Division 23 and elsewhere in the project documents.
- C. Understanding that the contractors for various Divisions are sub-contractors to the Prime Contractor, assignments of work by division are not intended to restrict the Prime Contractor in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.

#### 1.2 Permits and Regulations

- A. Include payment of all permit and inspection fees applicable to the Division 23 work. Furnish for the Owner certificates of approval from the governing inspection agencies, as a condition for final payment.
- B. Work must conform to applicable local, state and federal laws, ordinances and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. Install no work contrary to minimum legal standards.

#### 1.3 Inspection of Site

- A. Inspect the premises of the existing building. Conditions shall be compared with information shown on the drawings. Report immediately to the Architect any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

#### 1.4 Drawings and Specifications

- A. The drawings indicate the general arrangement of the work and are to be followed insofar as possible. The word "provide", as used, shall mean "furnish and install". If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Architect for approval before proceeding with the work.
- B. Make all necessary field measurements to ensure correct fitting. Coordinate work with all other trades in such a manner as to cause a minimum of conflict or delay.
- C. The drawings and specifications shall be carefully studied during the course of bidding and construction. Any errors, omissions or discrepancies encountered shall be referred immediately to the Architect for interpretation or correction, so that misunderstandings at a later date may be avoided. The contract drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Having ductwork, pipe and fittings fabricated and delivered in advance of making actual measurements shall not be

sufficient cause to avoid making offsets and minor changes as may be necessary to install ductwork, piping and equipment.

- D. The Architect shall reserve the right to make minor adjustment in locations of system runs and components where considered desirable in the interest of concealing work or presenting a better appearance where exposed. Any such changes shall be anticipated and requested sufficiently in advance as to not cause extra work, or unduly delay the work. Coordinate work in advance with all other trades and report immediately any difficulties which can be anticipated.
- E. Equipment, ductwork or piping shall not be installed in the dedicated electrical space above or in the working space required around electrical switchgear, motor control centers or panelboards as identified by the National Electric Code (NEC).
- F. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict. The Architect's decision shall be final in regard to the arrangement of ductwork, piping, etc., where conflict arises.
- G. Provide offsets in system runs, additional fittings, necessary drains and minor valves, traps, dampers and devices required to complete the installation, or for the proper operation of the system. Exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- H. Should overlap of work among the trades become evident, this shall be called to the attention of the Architect. In such event, none of the trades or their suppliers shall assume that they are relieved of the work which is specified under their branch until instructions in writing are received from the Architect.

#### 1.5 Asbestos Materials

- A. Abatement, removal or encapsulation of existing materials containing asbestos is not included in the Division 23 Contract. Necessary work of this nature will be arranged by the Owner to be done outside of this construction and remodeling project by a company regularly engaged in asbestos abatement. Such work will be scheduled and performed in advance of work in the construction and remodeling project.
- B. If, in the performance of the work, materials are observed which are suspected to contain asbestos, the Contractor shall immediately inform the Architect who in turn will notify the Owner. Work that would expose workers to the inhalation of asbestos particles shall be terminated. Work may be resumed only after a determination has been made and unsafe materials have been removed or encapsulated and the area declared safe.
- C. Material provided for work performed under Division 23 shall not contain asbestos.

#### 1.6 Inspection

- A. All work shall be subject to inspection of Federal, State and local agencies as may be appropriate, and of the Architect and Engineer.
- B. Obtain final inspection certificates and turn over to the Owner.

#### 1.7 Record Drawings

- A. Maintain a separate set of field prints of the contract documents and hand mark all changes or variations, in a manner to be clearly discernible, which are made during construction and the coordination process. Upon completion of the work, and within 90 days of system acceptance, these drawings shall be turned over to the Architect. This shall apply particularly to underground and concealed work, and to other systems where the installation varies to a degree which would justify recording the change.

#### 1.8 Operating and Maintenance Manuals

- A. Assemble three copies each of operating and maintenance manuals for the HVAC work.
- B. All "approved" shop drawings and installation, maintenance and operating instruction pamphlets or brochures, wiring diagrams, parts list and other information, along with warranties, shall be obtained from each manufacturer of the principal items of equipment. In addition, prepare and include a chart listing all items of equipment which are furnished under this contract, indicating the nature of maintenance required, the recommended frequency of checking these points and the type of lubricating media or replacement material required. Name and address of a qualified service agency. A complete narrative of how each system is intended to operate.
- C. Final air and water balance reports and as-built automatic temperature controls drawings and specifications shall also be included.
- D. These shall be assembled into three-ring loose leaf binders or other appropriate binding. An index and tabbed sheets to separate the sections shall be included. These shall be submitted to the Engineer for review. Upon approval, manuals shall be turned over to the Owner.

#### 1.9 Final Inspection and Punch List

- A. As the time of work completion approaches, survey and inspect Division 23 work and develop a punch list to confirm that it is complete and finished. Then notify the Architect and request that a final inspection be made. It shall not be considered the Architect's or Engineer's obligation to perform a final inspection until the Contractor has inspected their work and so states at the time of the request for the final inspection.
- B. Requests to the Architect, Engineer for final inspection may be accompanied by a limited list of known deficiencies in completion, with appropriate explanation and schedule for completing these; this is in the interest of expediting acceptance for beneficial occupancy.
- C. The Architect and/or Engineer will inspect the work and prepare a punch list of items requiring correction, completion or verification. Corrective action shall be taken to the satisfaction of the Architect and Engineer within 30 days of receipt of the Architect/Engineer's punch list.

#### 1.10 Warranty

- A. Warrant all workmanship, equipment and material entering into this contract for a period of one (1) year from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Use of equipment for temporary heating or cooling is not the start of the warranty period.
  - 1. Certain items of equipment are specified to have multi-year parts and labor warranties. Refer to individual equipment specifications.

- B. This provision is intended specifically to cover deficiencies in contract completion or performance which are not immediately discovered after systems are placed in operation. Also included shall be supplementary assistance in balancing, adjusting or providing operating instructions as the need develops, and replacing overload heater elements in starters where necessary to keep systems in operation. Heater element sizes shall not exceed the motor manufacturer's recommendations.
- C. This provision shall not be construed to include maintenance items such as replacing filters, re-tightening or repacking glands, greasing, oiling, belt tightening and cleaning strainers after these have been done for final close-out.
- D. Provisions of this warranty shall be considered supplementary to warranty provisions under Division 01 General Conditions.

#### 1.11 Pre-Installation Meetings

- A. Refer to Section 01 30 00 Administrative Requirements.

### **PART 2 - PRODUCTS**

#### 2.1 Materials and Equipment

- A. Materials and equipment furnished shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.

#### 2.2 Listing and Labeling

- A. All equipment and appliances shall be listed and labeled in accordance with the Mechanical Code. Testing shall be performed by an Approved Agency, with the seal or mark of the Agency affixed to each piece of equipment or appliance.

#### 2.3 Reference Standards

- A. Where standards (NFPA, NEC, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the Authority Having Jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

#### 2.4 Equipment Selection

- A. The selection of materials and equipment to be furnished shall be governed by the following:
  - 1. Where trade names, brands, or manufacturers of equipment or materials are listed in the specification, the exact equipment listed shall be furnished. Where more than one name is used, the contractor shall have the option of selecting between any one of the several specified. All products shall be first quality line of manufacturers listed.
  - 2. Where the words "or approved equal" appear after a manufacturer's name, specific approval must be obtained from the Engineer during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.
  - 3. Where the words "equal to" appear, followed by a manufacturer's name and sometimes a model or series designation, such designation is intended to establish quality level and standard features. Equal equipment by other manufacturers will be acceptable, subject to the Engineer's approval.

- B. Substitute equipment of equal quality and capacity will only be considered when the listing of such is included as a separate item of the bid. State the deduction or addition in cost to that of the specified product.
- C. Before bidding equipment, and again in the preparation of shop drawings, verify that adequate space is available for entry and installation of the item of equipment, including associated piping and accessories. Also verify that adequate space is available for servicing of the equipment.
- D. If extensive changes in pipe, duct or equipment layout, electrical or control wiring, or equipment are brought about by the use of equipment which is not compatible with the layout shown on the drawings, necessary changes shall be deemed to be included in this contract, including other effected trades.

## 2.5 Shop Drawings

- A. Electronic copies of shop drawings and descriptive information of equipment and materials shall be furnished. Submit to the Architect and/or Engineer for review as stated in the General Conditions and Supplementary Conditions. These shall be submitted as soon as practicable and before equipment is installed and before special equipment is manufactured. Submittal information shall clearly identify the manufacturer, specific model number, approval labels, performance data, electrical characteristics, features, specified options and additional information sufficient to evidence compliance with the contract documents. Product catalogs, brochures, etc. submitted without project specific items marked as being submitted for review will be rejected and returned without review. Shop drawings for equipment, fixtures, devices and materials shall be labeled and identified same as on the Contract Documents. If compliance with the above criteria is not provided shop drawings will be subject to rejection and returned without review. Samples shall be submitted when requested or as specified here with-in.
- B. The review of shop drawings by the Architect or Engineer shall not relieve the Contractor from responsibility for errors in the shop drawings. Deviations from specifications and drawing requirements shall be called to the Engineer's attention in a separate clearly stated notification at the time of submittal for the Engineer's review.
- C. Shop drawings of the following HVAC equipment and materials shall be submitted:
  - 1. Ductwork insulation.
  - 2. Smoke dampers.
  - 3. Air outlets and inlets.
  - 4. VAV boxes (Dual Duct)
  - 5. Automatic Temperature Controls.

## PART 3 - EXECUTION

### 3.1 Operation and Adjustment of Equipment

- A. As each piping system and air distribution system is put into operation, all items of equipment included therein shall be adjusted to proper working order. This shall include balancing air and water systems, adjusting fan speeds, belts, pulleys, tightening packing glands, and adjusting all operating equipment.
- B. Caution: Verify that all bearings are lubricated, all motors are operating in the right direction, and correct drive settings and overload heater elements are provided on all motors. Do not depend wholly on the electrician's judgment in these matters. Follow specific instructions in

regard to lubrication. Do not oil or grease presealed ball bearings unless upon manufacturer's specific instructions.

### 3.2 Operating Demonstration and Instructions

- A. Set the various systems into operation and demonstrate to the Owner and Architect and Engineer that the systems function properly and that the requirements of the Contract are fulfilled.
- B. Provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems. A thorough review of the operating and maintenance manuals shall be included in these instructional meetings.
- C. O&M manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.

END OF SECTION

**23 05 02      AGREEMENT AND WAIVER FOR USE OF ELECTRONIC FILES**

**PART 1 - GENERAL**

- 1.1 The Engineer, at their sole discretion and without obligation, makes graphic portions of the contract documents available for use by the contractor in electronic format. These electronic files are proprietary, and remain the Engineer's Instruments of Service and shall be for use solely with respect to this project, as provided in the Standard Form of Agreement between Owner/Architect and Engineer.
- 1.2 Electronic files shall be released only after bids have been received for the project and contracts have been signed with the contractors.
- 1.3 The contractor shall acknowledge receipt of electronic files in the requested format for this project. The electronic files are provided as a convenience to the User, for use in preparing shop drawings and/or coordination drawings related to the construction of only the project identified in the Agreement. The electronic files and the information contained within are the property of the Engineer and/or the Architect and/or the Owner, and may not be reproduced or used in any format except in conjunction with the project identified in the Agreement.
- 1.4 The User acknowledges that the information provided in the electronic files is not a substitution or replacement for the Contract Documents and does not become a Contract Document. The User acknowledges that neither the Engineer, the Architect, the Consultants, the Client or the Owner make any warrant or representation that the information contained in the electronic files reflect the Contract Documents in their entirety. The User assumes full responsibility in the use of the electronic files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
- 1.5 The User acknowledges that the receipt of electronic files in no way relieves the User from the responsibility for the preparation of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
- 1.6 Electronic files are available in a .DWG or .RVT format for a cost as indicated in the Agreement and Waiver Form. **Providing the documents in a .DWG version that differs from the product version that the .DWG files were initially created in will incur additional charges per sheet, as indicated in the Agreement and Waiver Form.** Charges are for the Engineer's time to prepare the documents in the format stated. They are available through the Engineer's office on a C.O.D. basis only. A sample of the format will be provided by the Engineer upon request by the contractor, for the purpose of testing the compatibility of the format to the contractor's systems.
- 1.7 All drawings will be in an AutoCAD file format, when requested to be .DWG format.
- 1.8 All project models will be furnished without views.
- 1.9 All electronic files shall be stripped of the Project's name and address, the Architect's and Engineer's and any consultant's name and address, and any professional licenses indicated on the contract documents, (and all dimensions, verbiage, and statistical information). Use of these electronic files is solely at the contractor's risk, and shall in no way alter the contractor's Contract for Construction.
- 1.10 The User agrees to indemnify, hold harmless and defend the Engineer, the Architect, the Consultants, the Owner, the Client and any of their agents from any litigation resulting from the use of (by any means of reproduction or electronic media) these files. The Engineer makes no

representation regarding fitness for any particular purpose, or suitability for use with any software or hardware, and shall not be responsible or liable for errors, defects, inexactitudes, or anomalies in the data, information, or documents (including drawings and specifications) caused by the Engineer's or its consultant's computer software or hardware defects or errors; the Engineer's or its consultant's electronic or disk transmittal of data, information or documents; or the Engineer's or its consultant's reformatting or automated conversion of data, information or documents electronically or disk transmitted from the Engineer's consultants to the Engineer.

- 1.11 The contractor waives all claims against the Engineer, its employees, officers and consultants for any and all damages, losses, or expenses the contractor incurs from such defects or errors in the electronic files. Furthermore, the contractor shall indemnify, defend, and hold harmless the Engineer, and its consultants together with their respective employees and officers, harmless from and against any claims, suits, demands, causes of action, losses, damages or expenses (including all attorney's fees and litigation expenses) attributed to errors or defects in data, information or documents, including drawings and specifications, resulting from the contractor's distribution of electronic files to other contractors, persons, or entities.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

- 3.1 Attached "Agreement" shall be submitted with accompanying payment to the Engineer prior to delivery of electronic files.

END OF SECTION





**23 05 02A**  
**ELECTRONIC FILES HEAPY RELEASE FORM TO CONTRACTORS**

**Project:** Sinclair Community College  
EMS Classroom-SIM LAB  
444 West Third St  
Dayton, OH 45402

**Owner:** Sinclair Community College

**Heapy Engineering Project Number:** 2024-06062

**Heapy Engineering Project Manager:** Nick Andrews

The Provider, named below, will furnish the Recipient, named below, certain documents prepared by the Provider or its sub consultants in an electronic format. These documents are hereinafter collectively referred to as "Electronic Files". The Electronic Files are instruments of the Provider services performed solely for the Owner's benefit and to be used solely for this Project. The Provider does not represent that the information contained in the Electronic Files are suitable for use on any other project or for any other purpose. If the Electronic Files are used for any other project or purpose without the Provider's specific written permission, the risk of such use shall be assumed solely by the Recipient or other user.

**Prior to the use of the Electronic Files the Provider and the Recipient agree to the following terms and conditions:**

1. The Provider and Recipient fully understand that the data contained in these electronic files are part of the Provider's Instruments of Service. The Provider shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.
2. The Recipient confirms their request to the Provider for Electronic Files for the Project listed above, which the Recipient understands are to be provided only in accordance with, and conditioned upon, the terms and conditions of the Agreement and Waiver for Use of Electronic Files).
3. The Provider agrees that the Recipient may use the Electronic Files for the sole purpose of preparing shop drawings and/or coordination drawings for the above Project only. Any Electronic Files provided are strictly for the use of the Recipient in regard to the Project named above, and shall not be utilized for any other purpose or provided by the Recipient to any entity other than its subcontractors for the Project named above.
4. The Recipient acknowledges that the furnishing of Electronic Files in no way relieves the Recipient from the responsibility of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
5. The Recipient acknowledges:

- a. That the Electronic Files do not contain all of the information of the Bid Documents or Contract Documents for the construction of the Project above.
  - b. That information in the Bid Documents or Contract Documents may be revised or modified in the future.
  - c. The Provider does not have, and will not have, any duty or obligation to advise or give notice to the Recipient of any such revisions or modifications.
  - d. That the Recipient agrees that its use of the Electronic Files is at the Recipient's sole risk of liability, and that the Recipient shall make no claim or demand of any kind against the Provider arising out of Recipient's receipt or use of the Electronic Files.
6. The Provider makes no representation or warranty of any kind, express or implied, with respect to the Electronic Files and specifically makes no warranty that the Electronic Files shall be merchantable or fit for any particular purpose, or accurate or complete. Furthermore, any description of said Electronic Files shall not be deemed to create an implied or express warranty that such Electronic Files shall conform to said description.
7. Due to the unsecured nature of the Electronic Files and the inability of the Provider or the Recipient to establish controls over their use, the Provider assumes no responsibility for any consequences arising out of the use of the data. It is the sole responsibility of the Recipient to check the validity of all information contained within the Electronic Files. The Recipient shall at all times refer to the Construction Documents of the project during all phases of the project. The Recipient shall assume all risks and liabilities resulting from the use of this data, and the Recipient agree(s) to waive any and all claims and liability against the Provider and its sub consultants resulting in any way from the use of the Electronic Files.
8. Electronic Files are provided strictly as a courtesy by the Provider solely for the convenience of the Recipient, and are not part of the Bid Documents or Contract Documents for the Project. The Electronic Files do not replace or supplement the paper copies of any drawings, specifications, or other documents included in the Contract Documents for use on the project.
- a. The Recipient assumes full responsibility in the use of Electronic Files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
9. As stated herein, the possibility exists that the Electronic Files provided may differ from the Bid Documents or Contract Documents for construction of the Project. The Provider shall not be responsible, nor be held responsible, for differences between Electronic Files, the Bid Documents, and Contract Documents. The Bid Documents or Contract Documents for the Project may be modified by the Provider at any time, either before or after construction begins. The Provider has no responsibility, either before or after any such modification, to determine or to advise the Recipient whether any such modification causes Electronic Files provided to the Recipient to be out of date, inconsistent with the Bid Documents or Contract Documents, or otherwise unsuitable or unfit for use in any way.
10. The Recipient assumes all risk and liability for any losses, damages, claims, or expenses (including defense and attorney fees) resulting from its receipt, use, or possession of Electronic Files furnished by the Provider. The Provider makes no representation, warranty or guarantee that the Electronic Files:
- a. Are suitable for any other usage or purpose.

- b. Have any particular durability.
  - c. Will not damage or impair the Recipient's computer or software.
  - d. Contain no errors or mechanical flaws or other discrepancies that may render them unsuitable for the purpose intended by the Recipient.
11. Recipient agrees to indemnify, defend and hold harmless the Provider, agents, employees, and the Owner from, and against, any and all claims, suits, losses, damages or costs, of any kind or nature, including attorney's fees, arising from or by reason of the Recipient's use of Electronic Files provided by the Provider, and such defense and indemnification obligation duties shall survive any use under this Agreement and Waiver for Use of Electronic Files.
12. The Recipient agrees that the Provider shall have no responsibility whatsoever for problems of any nature arising from transmitting and storing electronic files at a Recipient requested FTP or project management site or the conversion of the Electronic Files by the Recipient or others for use in non-native applications. The Provider will not provide Electronic Files in compressed formats. Recipient agrees to accept the files in the format provided by the Provider, and that Recipient's conversion or electronic file storage at the Recipient's requested site, shall be at Recipient's sole risk.
13. Recipient acknowledges:
- a. That the Electronic Files provided by the Provider are a graphical representation of the building in order to generate two-dimensional industry standard drawings.
  - b. That the data contained in the Electronic Files may not be 100% accurate and should not be used for dimensional control, building layout, shop drawings, or any other similar purpose
  - c. That any schedule of materials produced directly from the Electronic Files has not been checked for accuracy.
  - d. That the information in the Electronic Files should be used only for comparative purposes and shall not be relied upon for accurate quantity estimates or used in establishing pricing.
14. Electronic Files provided by the Provider will only contain elements and content that the Provider deems necessary and appropriate to share. No specific Level of Development (LOD) is implied or expected. The Recipient agrees that no proprietary content, MvParts or Revit Families or any other AutoCAD MEP or Revit MEP content shall be removed from the model and/or used for any other purpose but to support this specific project.
15. The Provider, at its sole discretion, may modify the Electronic files before they are provided to the Recipient. Such modifications may include, but are not necessarily limited to, removal of certain information. The Provider, at its sole discretion, may refuse to provide some or all Electronic Files requested by Recipient.
16. The availability of Electronic Files that were not prepared by the Provider is subject to the consent of the Owner or consultant that prepared those Electronic Files. The Provider will not negotiate with the Owner or consultant or repeatedly solicit the Owner or consultant to obtain such consent. Neither this Agreement and Waiver for Use of Electronic Files nor any such separate Consultant's consent may be assigned or transferred by Recipient to any other person or entity.

Provider (Name of Company): \_\_\_\_\_

Recipient (Name of Company): \_\_\_\_\_

Name of authorized Recipient Representative: \_\_\_\_\_

Title of authorized Recipient Representative: \_\_\_\_\_

E-mail address of authorized Recipient Representative: \_\_\_\_\_

Signature of authorized Recipient Representative: \_\_\_\_\_

Date: \_\_\_\_\_

NOTE: Select requested Electronic File Format, File Transfer Medium and complete applicable Cost Summary.

**A. Electronic File Format (select one):**

1.  .DWG Format - List of Drawings Requested: \_\_\_\_\_
2.  Revit Project Model Requested (Model only, no Views included)

**B. File Transfer Medium (select one):**

- Heapy FTP     User's FTP site     Project FTP site (when available)

**C. Delivery of Electronic Files Cost Summary:**

Available Electronic .DWG file format:

- 2022 DWG

If a different file version is required than the indicated available version state the requested version:

\_\_\_\_\_ .DWG

**Note that an additional charge per sheet will be incurred.**

Cost of Preparation of Division 23 Electronic .DWG Files:

First Drawing:	\$50.00		\$50.00
Additional Drawings \$15.00 each _____	x \$15.00	=	\$ _____
Conversion to .DWG version different from available .DWG:			
\$5.00 additional/sheet _____	x \$ 5.00	=	\$ _____

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_

All files will be bound together.

Available electronic Revit file format:

- 2022 .RVT

Cost of Preparation of Division 23 Electronic Revit Model Files:

Revit Project Model without Views	\$500.00
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Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_



**23 05 04 BASIC HVAC MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 Temporary Heating and Cooling

- A. The temporary heating and cooling for construction is provided by the Contractor. Refer to Division 01 - General Requirements.
- B. Fuel and electric costs attendant to temporary heating and cooling are not included in Division 23.
- C. The use of the permanent HVAC systems for temporary heating and cooling during the latter stages of construction shall be allowed. Expedite completion of system as practicable to this end. Maintain the system during this period. Provide and maintain temporary air filters (same as specified permanent filters) to protect coils and ducts. Replace temporary filters with the clean specified filters when the systems are turned over to the Owner. Air filters specified for the systems and units, including specified spare filters, are not to be used for temporary service.
- D. Warranty periods on equipment, materials and system shall commence upon Owner acceptance of the building or systems. Temporary heating or cooling use shall not jeopardize or alter the warranty requirements.

1.2 Continuity of Services

- A. Work shall be so planned and executed as to provide reasonably continuous service of existing systems throughout the construction period. Where necessary to disrupt services for short periods of time for connection, alteration or switch-over, the Owner shall be notified in advance and outages scheduled at the Owner's reasonable convenience.
- B. Submit, on request, a written step-by-step sequence of operations proposed to accomplish the work. The outline must include tentative dates, times of day for disruption, downtime and restoration of services. Submit the outline sufficiently in advance of the proposed work to allow the Architect or Engineer to review the information with the Owner. Upon approval, final planning and the work shall be done in close coordination with the Owner.
- C. Shutdown of systems and work undertaken during shutdown shall be bid as being done outside of normal working hours.

**PART 2 - PRODUCTS**

**PART 3 - EXECUTION**

3.1 Workmanship

- A. Materials and equipment shall be installed and supported in a first-class and workmanlike manner by mechanics skilled in their particular trades. Workmanship shall be first-class in all respects, and the Architect and Engineer shall have the right to stop the work if highest quality workmanship is not maintained.

3.2 Protection

- A. Each Contractor shall be entirely responsible for all material and equipment furnished in connection with their work. Special care shall be taken to properly protect all parts thereof from theft, damage or deterioration during the entire construction period in such a manner as may be necessary, or as directed by the Architect.
- B. The Owner's property and the property of other contractors shall be scrupulously respected at all times. Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

### 3.3 Cutting and Patching

- A. Refer to Division 01 - General Requirements and Special Conditions for information regarding cutting and patching.
- B. Plan the work well ahead of the general construction. Where pipes and ducts are to pass thru new walls, partitions, floors, roof or ceilings, place sleeves in these elements or arrange with the General Trades to provide openings where sleeves are not practical. Where sleeves or openings have not been installed, cut holes and patch as required for the installation of this work, or pay other trades for doing this work when so directed by the Architect. Any damage caused to the building shall be repaired or rectified.
- C. Where pipes and ducts are to pass thru, above or behind existing walls, partitions, floors, roof or ceiling, cutting, patching and refinishing of same shall be included in this contract. Core drilling and saw cutting shall be utilized where practical. Contractor to examine where floors and walls, etc. are to be cut for presence of existing utilities.
- C. When cutting or core-drilling floor verify location of existing electrical, plumbing or steel reinforcement. Use X-ray method to verify existence of obstructions. Either re-route existing system brace floor or alter location of new work to maintain existing system.
- D. All sleeves and openings not used or partially used shall be closed to prevent passage of smoke and fire.
- E. All materials, methods and procedures used in patching and refinishing shall be in accordance with applicable provisions of specifications governing the various trades, and shall be completed by skilled workmen normally engaged in these trades. The final appearance and integrity of the patched and refinished areas must meet the approval of the Architect. Wall, floor and ceiling refinishing must extend to logical termination lines (entire ceiling of the room repainted, for instance), if an acceptable appearance cannot be attained by finishing a partial area.
- F. Provide steel angle or channel lintels to span openings which are cut in existing jointed masonry walls where the opening span exceeds 16 inches. Provide framing around roof openings for required support of the roof deck.

### 3.4 Removals, Alterations and Reuse

- A. Refer to the drawings for the scope of remodeling in the existing building.
- B. Cooperate with all trades regarding all removal and remodeling work. Unless otherwise noted, remove existing work which is associated with Division 23 and which will be superfluous when the new work is installed and made operational.



- C. Extraneous ductwork and piping which is or becomes accessible shall be removed and stubs shall be capped at the first active duct or pipe encountered. Ductwork and piping that is and remains inaccessible shall be abandoned. Ends of abandoned duct and pipe shall be capped so as to be concealed by finished surfaces. Upon completion of the work no abandoned duct, pipe, valve or stub shall extend thru finished floors, walls or ceilings.
- D. When it is necessary to reroute a section of active ductwork or piping the rerouted section shall be installed before removing the existing in order to minimize system down time. Rerouted sections shall be insulated as required for new work. Patch insulation on existing ductwork and piping which has been damaged or removed in this work.
- E. Materials and equipment which are removed shall not be reused within the scope of this project unless specifically noted to be relocated or reused. Turn over to the Owner and place where directed on the premises all removed material and equipment so designated by the Owner. All material and equipment not claimed by the Owner shall become the property of the Contractor responsible for removal and shall be removed from the premises.
- F. Remove, store and reinstall lay-in ceiling tile and grid as needed to perform work in areas where such removal and re-installation is not to be done by others. Damaged tile and/or grid shall be replaced with new matching tile and/or grid.
- G. In areas of minor work where the space is not completely vacated, temporarily move portable equipment and furnishings within the space as required to complete the work. Coordinate this activity with Owner. Protect the Owner's property by providing dust covers and temporary plastic film barriers to contain dust. Remove barriers and return equipment and furniture upon completion of the work.
- H. Refinish any surface disturbed under this work to match existing, except where refinishing of that surface is included under the General Contract.

### 3.5 Painting

- A. In addition to any painting specified for various individual items of equipment, the following painting shall be included:
  - 1. Ferrous metal which is not factory or shop painted or galvanized and which remains exposed to view in the finished areas of the building shall be given a prime coat of paint and two finish coats of paint.
  - 2. Ferrous metal installed outside the building which is not factory or shop painted or galvanized shall be given a prime coat of paint and two finish coats of paint.
  - 3. Equipment and materials which have been factory or shop coated (prime or finished painted or galvanized), on which the finish has been damaged or has deteriorated, shall be cleaned and refinished equal to its original condition. The entire surface shall be repainted if a uniform appearance cannot be accomplished by touch up.
  - 4. Apply Z.R.C. Galvilite cold galvanizing compound or approved equal, for touch-up of previously galvanized surfaces.
  - 5. Inside of ducts, behind grilles and registers, shall be painted flat black to eliminate the viewing of shiny surfaces.
- B. Paint, surface preparation and application shall conform to applicable portions of the Painting section of Division 09 of the Specifications. All rust must be removed before application of paint.
- C. Finish painting is included in the General Contract.

### 3.6 Access Panels

- A. Install access panels or pay general trade to do so. Final appearance is subject to approval by the Architect or Engineer.
- B. Location of access panels shall be planned to clear ceiling lights, ceiling support grids and other obstructions so as to allow, wherever possible, full shoulder clearance beside the device to be inspected, adjusted or repaired.
- C. Panels with recessed doors are to be fitted with insert panels of drywall. Caution the Installing Contractor to provide appropriate framing with drywall beading to ensure a finished appearance. Shim strips may be required to bring the insert panel flush with the plane of the door and wall / ceiling.

### 3.7 Miscellaneous Component Installations

- A. Certain miscellaneous items and components are furnished loose and require installation into the duct systems, piping systems, and other HVAC systems. These items shall be installed per the suppliers and manufacturers instructions.
- B. This shall include, but by no means be limited to, items such as balancing dampers, backdraft dampers, motorized dampers, gravity dampers, fire and/or smoke dampers, sound attenuation products, control valves and components and other similar items.
- C. Provide compatible connection means for all items being installed.
- D. Provide bulb wells for temperature control equipment, and coordinate accordingly. Other types of control devices (dp switches, flow switches, flow meters, etc.) shall also be installed, with devices, needed fittings (tees, weldolets, threadolets, etc.), locations and installation details closely coordinated.
- E. Provide all required access means (access doors, etc...) required for installation, service and inspection.

END OF SECTION

**23 05 05 FIRESTOPPING**

**PART 1 - GENERAL**

- 1.1 Firestopping assemblies shall be provided at penetrations of piping and non-fire dampered ducts thru fire rated floors, fire rated floor-ceiling and roof ceiling assemblies, fire rated walls and partitions and fire rated shaft walls and partitions. In addition, firestopping assemblies shall be provided at penetrations thru 0-hour rated floors. Refer to the drawings for fire rated building elements and HVAC drawings for pipe and duct layouts.
- 1.2 New piping and ductwork penetrating existing building elements shall be firestopped.
- 1.3 Firestopping assemblies shall be tested and rated in accordance with ASTM E814, E119 and listed in accordance with UL 1479, as published in the UL Fire Resistance Directory. Firestopping shall provide a fire rating equal to that of the construction being penetrated.
- 1.4 Firestopping materials, assemblies and installation shall conform to requirements of the code and the Authority Having Jurisdiction.
- 1.5 For those firestopping applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.6 Shop drawings shall be prepared and submitted for review and approval. Submittals shall include manufacturer's specifications and technical data of each material, documentation of U.L. firestopping assemblies and installation instructions. Submittals shall include all information required by the Building Code.

**PART 2 - PRODUCTS**

- 2.1 Firestopping materials shall be manufactured and/or supplied by Hilti, 3M, Tremco, or Specified Technologies Inc (STI).
- 2.2 Materials shall be in the form of caulk, putty, sealant, intumescent material, wrap strip, fire blocking, ceramic wool and other materials required for the UL listed assemblies. These shall be installed in conjunction with sleeves and materials for fill and damming.
- 2.3 Combination pre-set floor sleeve and firestopping assemblies shall be equal to Hilti CP 680.

**PART 3 - EXECUTION**

- 3.1 Installation of all materials and assemblies shall be in accordance with UL assembly drawings and the manufacturer's instructions.
- 3.2 Installation shall be done by an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary training and experience.
- 3.3 Firestopping shall not be installed at fire dampers that would impair the needed free expansion of damper, sleeve and retaining angles in a fire condition. Refer to the installation instructions of the fire damper manufacturer.

- 3.4 Refer to 23 05 07 Piping Materials and Methods for pipe sleeve requirements and treatment of penetrations not requiring firestopping. Refer to 23 31 13 HVAC Ductwork for duct sleeve requirements where firestopping is required.

END OF SECTION

## 23 05 13 ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT

### PART 1 - GENERAL

- 1.1 Motors, starters, disconnects, devices, fuses, wiring and other electrical work included in Division 23 shall be factory installed or furnished and field installed as specified in the various specification sections and as shown on the drawings. Refer to the project documents for requirements related to each trade. Coordinate all aspects of electrical components and wiring to complete the systems.
- 1.2 Equipment control panels containing power control components shall be marked with the minimum SCCR rating. The rating shall not be less than the available fault current. Refer to the electrical drawings for the calculated available fault at the distribution panel, MCC or panelboard serving the equipment. Include confirmation of being protected from the fault current in the equipment shop drawing submittal.
- 1.3 Note: Equipment with Electronically Commutated Motors (ECM's) are sometimes factory programmed to limit current draw to the motor, to limit the available brake horsepower to better match specified performance and reduce required power circuiting. This reduced brake horsepower is likely below the motor's nameplate rating. The electrical design documents may be sized based on the ECM's nameplate motor horsepower. The equipment supplier shall notify the Division 23 and 26 contractors and the Engineer if the maximum overcurrent protection on the design documents differs from their selected equipment's nameplate data. Any required revisions to the electrical circuiting, including maximum over-current protection devices, shall be documented on the shop drawing submittal. The required revisions must be forwarded to the Division 26 contractor with enough time to adjust the over-current protection and the electric circuit installation. However, any additional cost associated with increased electrical feeder/breaker sizes or lack of coordination listed above shall be the Division 23 contractor's responsibility.
- 1.4 Refer to the Electrical drawings and verify adequacy of feeder size, sets of conductors and size, disconnecting means and other electrical requirements. Compare these to the requirements of the equipment to be furnished and report deficiencies and / or discrepancies to the Engineer in the bid period for resolution by addendum. Bear all costs for electrical changes where such issues are not properly resolved.
- 1.5 Equipment and devices shall comply with applicable standards of NEMA and shall be UL listed. All work shall comply with the National Electrical Code.
- 1.6 Electrical equipment, devices, fuses, wire, conduit and methods shall comply with applicable provisions of Division 26 - Electrical.

### PART 2 - PRODUCTS

- 2.1 Motors
  - A. General purpose motors shall be induction type 1750 rpm NEMA Design "B" with copper windings, Class B or F insulation, and motor enclosure to suit the application. Service factor shall be 1.15 minimum.
  - B. Two-speed motors shall be two-winding type with six leads unless otherwise specified.
  - C. Motors for other than general duty application shall be furnished to suit the application and operating environment.

- D. Premium efficiency motors shall be equal to Century "E + 3", General Electric "Energy Saver Premium Efficiency", Baldor "Super E Premium Efficient" or Reliance "Premium Energy Efficient" series. Motor efficiencies shall be tested and conform to NEMA Standard Publication MG-1 and IEEE 112 Test Method B.
  - E. Motors used with Adjustable Frequency Motor Controllers (Variable Frequency Drives) shall be rated for inverter service in accordance with NEMA Standard Publication MG-1, Part 31 and designed with Class F or H insulation, but with a Class B temperature rise. Motors connected to VFD's shall be furnished with AEGIS SGR shaft grounding ring kit, installed by the equipment manufacturer.
  - F. Motor sizes shown on the drawings are to be considered minimum. Motors furnished shall be sized so as to not operate in the service factor range. Motors for direct driven pumps and fans shall be selected so as to not operate in the service factor range at any point on the curve.
  - G. Compare the electrical power requirements of the intended equipment with power feeders to the equipment shown on the Electrical drawings. Verify adequacy and compatibility of voltage, phase, wiring capacity, number and size of conductors (versus equipment connection points), maximum over-current protection, fusing and other information to that required for the equipment. If the selected equipment requires revision of the electrical, include any added cost to do so.
- 2.2 Magnetic starters shall comply with provisions of Division 26 - Electrical specifications and shall be NEMA construction (IEC rated not acceptable) with thermal overload element on each phase, 115 volt control voltage and hand-off-automatic switch, where appropriate. An integral control transformer shall be incorporated in the starter for each motor of 200 volt and greater. A single control transformer is acceptable for multiple motor packaged equipment, however, when such is the manufacturer's standard. Duplex type units (pumps, compressors, etc.) are not included in this exception. A control transformer shall be provided in each starter to ensure standby operating capability.
- 2.3 Wire and conduit shall comply with applicable provisions of Division 26 - Electrical specifications. Control wiring lighter than No. 12 AWG is acceptable where lesser ampacity will permit. All power and control wiring shall be overcurrent protected per the National Electric Code.

### **PART 3 - EXECUTION**

- 3.1 Motor connections of factory assembled equipment shall be made with flexible conduit except for plug-in electric cord connections.
- 3.2 All power wiring shall be run in conduit. Control wiring shall be run in conduit except where open wiring is specified in the various sections.
- 3.3 Fuses shall be furnished and installed in fuse clips of equipment and switches.

END OF SECTION

**23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC**

**PART 1 - GENERAL**

- 1.1 Provide air balancing of the new systems and existing systems affected by the new work. Balancing work shall be performed by Kahoe, American Air Balance, or Fulton and Associates. Include a certification sheet signed and sealed by the certified testing and balancing authority. Include a list of instruments to be used for procedures, along with proof of calibration.
- 1.2 Methods, procedures, equipment, certifications, report forms and reporting information shall be in accordance with the standards of AABC or NEBB and latest edition of the SMACNA TAB Procedural Guide and industry practice.
- 1.3 During the bid period, call to attention any requirements for additional balancing dampers, test ports, gage cocks, thermometer wells, flow control devices, valves, balancing valves and fittings and manual volume dampers which are deemed necessary in addition to those shown on the drawings, and provide such so that proper balancing can be performed. Prior to installation of the systems, verify that the proper number and location of balancing devices are adequate for completion of the balancing work.
- 1.4 Prepare a balancing plan that includes strategies and step-by-step procedures. This plan should include a list of items that must be completed before balancing can proceed. Prepare a schedule to ensure adequate time for the balancing process and submit this schedule to the Architect for review.
- 1.5 When project is in phases and partial occupancy is planned, determine process to allow balancing work to be completed before occupancy.
- 1.6 Refer to Section 23 05 31 HVAC Equipment Drives and other Sections of Division 23 for requirements related to the balancing work.
- 1.7 Verify that all equipment start-up services have been completed before the beginning of any balancing work. After initial start-up has been completed, inform the balancer that the systems are operating properly, that all safety interlocks and protective devices are functioning, and the systems are ready to be balanced.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

- 3.1 Air Balance
  - A. Each air supply, return, and exhaust system, when installation is completed, including the installation of clean filters, shall be set in operation for balancing. Determine the best location in main and branch ducts for accurate duct airflow measurements. Each air outlet and inlet device, item of equipment (fan coils, air control units, etc.), shall be balanced to the quantities listed on the drawings within plus or minus 10 percent. Intended pressure relationships in areas required by recognized standards and practice shall be attained.
  - B. Witness all duct pressure and leakage tests. Refer to 23 31 13 and coordinate accordingly.
  - C. Check for airflow blockages.

- D. Check for proper sealing of air duct systems. Minor issues shall be reported in the balancing report. If a major issue is found, stop balancing work and report issue to the Engineer.
- E. In balancing of variable air volume systems, the total air quantity of the devices generally exceeds the fan air quantity due to the nature of the VAV system. The fan speed shall be set to deliver the required maximum fan cfm (not the total cfm of all of the devices) with duct static pressure sufficient (and yet not excessive) for proper operation. Terminal air control units shall be repositioned for fan balancing to deliver the maximum fan cfm.
- F. Balancing of terminal air control units and air devices shall be done to provide adequate but not excessive pressure in the branch ducts to air control units and air devices. Dampers incorporated in air devices shall be used only as secondary balancing means when other branch dampers are provided. Check, test and calibrate as required all terminal air control unit cfm settings (maximum, minimum). Also, record static pressure drop across the air control unit and reheat coil.
- G. The report shall include, but not be limited to, fan curves, both actual and design fan cfm, rpm, brake HP, entering and leaving static pressures, motor data, voltage and amperage and drive information. System air flows by device, terminal, branch and system shall be reported.

In addition, a sketch shall be provided for each air system balanced or surveyed, depicting exact location that fan static pressure and fan CFM readings were taken, relative to fan inlet and discharge, and what duct accessories were in place near the reading location and between the reading location and the fan. The sketch shall also depict elbows and other duct transitions in place near the reading location and between the reading location and the fan. Air handling unit sketches shall depict all air path components with-in the unit, and static pressure readings across each item. Balance reports will be rejected without this information.

- H. Mark equipment and balancing device setting with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-controls levers, and similar controls and devices, to show final setting.

3.2 After completion of the balancing work, a full report shall be prepared in pencil and two copies (only) submitted to the Engineer for preliminary review. After review, additional balancing, adjustments, drive replacements, readings and recordings deemed necessary shall be done and the report revised. Six typed copies of the final report shall be submitted to the Engineer for review and approval. An approved copy of the report shall be included in each set of operating and maintenance manuals.

3.3 Final Report contents: In addition to certified field report data, include the following:

- A. Table of Contents with total number of pages defined for each section of the report.
- B. Summary of Contents - include the following:
  - 1. Indicated versus final performance.
  - 2. Notable characteristics of systems.
  - 3. Description of system operation sequence if it varies from the contract documents.
- C. Nomenclature sheets for each item of equipment.
- D. Notes to explain why certain final data in the body of reports varies from indicated values.
- E. Fan Curves.



F. Manufacturers' test data.

- 3.4 Inspection after testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance reading documented in the final report. Submit random sampling percentages and results.

END OF SECTION



## 23 07 13 DUCT INSULATION

### PART 1 - GENERAL

- 1.1 All interior and exterior supply air, mixed air, and intake outside air ductwork and plenums shall be insulated unless specifically noted as “uninsulated” in the Duct Construction Schedule on the drawings, including ductwork in crawl spaces, attics, and buried under slab.
- 1.2 All interior return air ductwork and plenums shall be insulated unless specifically noted as “uninsulated” in the Duct Construction Schedule on the drawings.
- 1.3 Equipment and devices, accessories and stiffeners in insulated ductwork shall also be insulated. This includes but is not limited to external duct bracing and stiffeners, air control dampers and valves, and fire dampers. The backside of supply air diffusers shall also be insulated to prevent condensation, except if the air device is internally lined or factory insulated.
- 1.4 Required internal lining is indicated on the Duct Construction Schedule on the drawings. Refer to Section 23 31 13 - HVAC Ductwork and coordinate with the various trades.
- 1.5 Composite insulation assemblies shall meet UL 723 or ASTM E84 requirements and not exceed maximum flame spread of 25 and smoke development of 50, except as specifically allowed below, and “discrete” combustible components as defined by the mechanical code may be UL 2043 listed in lieu of UL 723 or ASTM E84. Identification of manufacturer, thermal resistance (R-value), flame spread and smoke-development shall be clearly marked on the exterior of the insulation at intervals as required by code.
- 1.6 Submittals
  - A. Submit product description, thermal characteristics and list of materials and thickness for each service and location.
  - B. Submit manufacturers published literature indicating proper installation procedures.
- 1.7 Delivery, Storage and Handling
  - A. Materials on site shall be stored in original factory packaging, labeled with manufacturer’s identification, including product density and thickness.
  - B. Protect insulation from weather and construction traffic, dirt, water, chemical and damage, in addition to storing in original wrapping.

### PART 2 - PRODUCTS

- 2.1 Insulation shall be manufactured by Johns Manville, Owens Corning, Certainteed, Knauf, Manson, or as listed below. Insulation for duct systems required to be insulated shall have a minimum installed R-value of 4.2 (at a 75 degrees F mean rating temperature).

“Installed” R-value for blanket insulation is the calculated R-value with 25 percent compression.  
“Installed” R-value for board insulation is the published nominal R-value.
- 2.2 Insulation on concealed ductwork shall be fiberglass blanket insulation with factory applied reinforced foil and kraft paper vapor barrier jacket, minimum 1.50 inches thickness and 0.75 inch p.c.f. density, formaldehyde-free or GreenGuard Certified for low formaldehyde and VOC emissions.

## **PART 3 - EXECUTION**

### **3.1 Site Inspection**

- A. Before starting work, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of insulation materials and accessories can begin.
- B. Verify that all insulation materials and accessories can be installed in accordance with project drawings and specifications and material manufacturers' recommendations.
- C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all insulation materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties.

### **3.2 Preparation**

- A. Ensure that all surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty or damaged insulation shall not be acceptable for installation.
- C. Ensure that pressure testing of ductwork and fittings has been completed prior to installing insulation.

### **3.3 Installation**

- A. Installation shall be done by tradesmen specializing in this work in strict accordance with manufacturer's recommendations.
- B. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices. External duct stiffeners and bracing shall be insulated same as for duct.
- C. Blanket insulation shall be wrapped tight to the duct. Insulation shall be secured to ducts 20 inches wide and greater with weld pins and fasteners, 18 inches on center maximum. Adhesive shall be applied to the duct as an aid to installation and adhesion. Vapor barrier jacket shall be lapped, stapled and sealed with adhesive and 3 inches wide FSK pressure sensitive tape.
- D. Board insulation with factory applied jacket shall be secured to the duct with weld pins and fasteners, 12 inches on center maximum. Vapor barrier jacket shall be lapped, stapled and sealed with adhesive and 3 inches wide ASJ pressure sensitive tape.
- E. Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage. All staples used on cold insulation shall be coated with suitable sealant to maintain vapor barrier integrity.
- F. Externally insulate the backsides of supply air devices that are mounted in ceilings and not internally insulated.

### **3.4 Protection**

- A. Advise as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.
- B. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

3.5 Safety Precautions

- A. Employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
- B. Conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.6 Reinsulate ductwork where existing insulation has been damaged or removed in the performance of work in this project.

END OF SECTION



**23 09 23 BUILDING AUTOMATION SYSTEM FOR HVAC**

**PART 1 - GENERAL**

1.1 Overview

- A. A complete system of automatic temperature controls shall be provided as required to accomplish the sequence of control for the various items of equipment and systems being installed. The system shall be a Direct Digital Control System (DDCS) utilizing electric actuation. All temperature control work shall be an extension of, and fully integrated with, the existing **campus-wide Siemens** control system.
- B. Furnish all labor, materials and equipment necessary for a complete and operating Building Automation System (BAS), utilizing direct digital controls and electric actuation as shown on the drawings and as described herein. Drawings are diagrammatic only.
- C. System software shall be based on a server/thin-client architecture, designed around the open standards of web technology. The control system server shall be accessed over the control system network, the Owner's local area network, and remotely over the Internet (through the Owner's LAN).
- D. Performance Monitoring: The BAS will provide the specified performance monitoring functionality, including required monitoring points and performance metrics, improved through system accuracy, data acquisition and data management capabilities, and required graphical and data displays.
- E. The intent and requirement of this specification and related sections is to provide a fully integrated, open, interoperable, peer-to-peer, networked, and distributed BAS. The following communication protocols are acceptable:
  - 1. ANSI/ASHRAE Standard 135 BACnet - A Data Communication Protocol for Building Automation and Control Networks
  - 2. MODBUS Application Protocol V1.1b (applicable to factory packaged equipment controllers only)
  - 3. Tridium Niagara Framework Protocol
  - 4. Internet Engineering Task Force RFC 7540 Hypertext Transfer Protocol HTTP/2
- F. The BAS shall be comprised of:
  - 1. Communications Network (Existing to Remain)
  - 2. Enterprise Network Server (Existing to Remain)
  - 3. Embedded Controller/Web Server(s) (Existing to Remain)
  - 4. Graphical User Interface
  - 5. Equipment controllers (B-AAC, B-ASC, MEC)
  - 6. Sensors (refer to Section 23 09 25)
  - 7. Controlled devices (refer to Section 23 09 25)
- G. Software License Agreement
  - 1. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract, and shall give him and their authorized agent full access to all features and functions of the installed BAS. Such license shall grant use of all programs and application software to Owner and their

- authorized agent as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.
2. It is the Owner's express goal to implement an open system that will allow products from various suppliers to be integrated into a unified system in order to provide flexibility for expansion, maintenance, and service of the system. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s). In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use with the Enterprise Network Server, Embedded Controller/Web Server(s), and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the owner. The owner shall determine which organizations to be named in the SI organization ID ("orgid") of all software licenses. All NiagaraAX or Niagara 4 software licences shall have the following NiCS: "accept.station.in=\*"; "accept.station.out=\*"; "accept.wb.in=\*"; "accept.wb.out=\*". All open NIC statements shall follow Niagara Open NIC specifications. Owner shall be free to direct the modification of the "orgid" in any software license, regardless of supplier, by Tridium Inc.
- H. All Embedded Controller/Web Servers shall be accessed via a single connection to the Enterprise Network Server. In this configuration, each Embedded Controller/Web Server can be accessed from a PC using Remote Desktop Connection Client User Interface and from a PC using Web Browser Client User Interface.
  - I. Local connections shall be via an Ethernet LAN. Remote connections shall be via Owner provided full-time, high-speed ISP connection for remote site access (i.e., T1, ADSL, cable modem) and IPv6 compliant. The owner shall be responsible for all monthly internet access fees and connection charges.
  - J. The basic control system includes all sensors, controllers, instruments, valves, actuators, devices, installation and service for a complete and functional control system. All control devices (valves, dampers, actuators, etc.) and associated power and control wiring shall be included. Refer to Section 23 09 25 Instrumentation and Control Devices for HVAC and Section 23 09 47 Control Power and Wiring for HVAC. The BAS shall be designed to allow easy field adjustment of all set points and parameters.
  - K. Provide for future system expansion to include monitoring of the access, intrusion detection, fire alarm, and lighting control systems.
- 1.2 Provider Requirements
- A. Manufacturer Qualifications
    1. All products used in the installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. The installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be made available for at least 10 years after completion of this contract.
  - B. Installer Qualifications
    1. Installing Contractor shall have an established working relationship with Control System Manufacturer of not less than 5 years.



2. Installing Contractor and their Sub-Contractors shall have successfully completed manufacturer's control system training. Provide certification of completed training, including hours of instruction and course outlines, within 10 days after bid date.
3. Installing Contractor shall have an office within 75 miles of the project site and provide 24 hour response in the event of a customer call, 7-days per week, 365 days per year.

### 1.3 Approved Control System Manufacturers and Installing Contractors

- A. Enterprise Server and Embedded Controller/Web Server products utilizing Siemens Apogee are the basis of design.
- B. Any material or equipment that will fully perform the duties specified will be considered 'equal,' provided the bid submits proof that such material or equipment is of equivalent substance and function and is approved, in writing. Requests for the approval of 'or equal' shall be made in writing at least five business days prior to bid opening. During the bidding period, all approvals shall be issued by the Architect/Engineer in the form of addenda at least two business days prior to the bid opening date.
- C. Any Manufacturer or Installing Contractor not pre-qualified above shall submit credentials for the Engineer's review seven or more days prior to the bid date. Applications submitted after seven days prior to the bid date will not be considered. Credentials must attest that the manufacturer and installer meet all requirements above. The Engineer's judgment in reviewing any manufacturer or contractor will be final.

### 1.4 Codes and Standards

- A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with the current editions of the following codes and standards:
  1. National Electric Code (NEC)
  2. Ohio Building Code (OBC) and Ohio Mechanical Code (OMC)
  3. National Fire Protection Association (NFPA)
  4. Ohio School Design Manual (OSDM)
  5. ANSI/ASHRAE Standard 55 Thermal Environmental Conditions For Human Occupancy
  6. ANSI/ASHRAE Standard 62 Ventilation For Acceptable Indoor Air Quality
  7. ANSI/ASHRAE Standard 90.1 Energy Standard For Buildings Except Low-Rise Residential Buildings
  8. ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Networks
  9. Underwriters Laboratories: Products shall be UL-916-PAZX Listed

### 1.5 The following sections constitute related work:

- A. Section 23 09 25 – Instrumentation and Control Devices for HVAC
- B. Section 23 09 47 – Control Power Wiring for HVAC
- C. Section 23 09 93 – Sequence of Operation for HVAC Controls.
- D. Section 23 09 95 – Direct Digital Control System Points List.

### 1.6 System Performance

- A. Performance Standards. System shall conform to the following minimum standards over network connections:
1. Graphic Display. A graphic with 20 dynamic points/objects shall display with current data within 10 seconds.
  2. Graphic Refresh. A graphic with 20 dynamic points/objects shall update with current data within 8 seconds.
  3. Object Command. Devices shall react to command of a binary object within 2 seconds. Devices shall begin reacting to command of an analog object within 2 seconds.
  4. Object Scan. Data used or displayed at a controller or user interface shall have been current within the previous 6 seconds.
  5. Alarm Response Time. An object that goes into alarm shall be annunciated at the user interface within 45 seconds
  6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 second. Select execution times consistent with the mechanical process under control.
  7. Performance. Programmable controllers shall be able to completely execute BAS PID control loops at a frequency adjustable down to once per second. Select execution times consistent with the mechanical process under control.
  8. Multiple Alarm Annunciations. Each user interface on the network shall receive alarms within 5 seconds of other user interfaces.
  9. Reporting Accuracy. System shall report values with the minimum end-to-end accuracy listed in Table 1 of Section 23 09 25 Instrumentation and Control Devices.
  10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2 of Section 23 09 25 Instrumentation and Control Devices.

#### 1.7 Submittals

- A. Refer to Section 23 05 01 – Basic HVAC Requirements.
- B. Begin no work until submittals have been approved for conformity with design intent. Provide drawings as electronic 11 inches x 17 inches prints of each drawing. When manufacturer's cutsheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawing shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Damper and valve schedules and data sheets may be submitted separately to improve product delivery dates. Provide submittals within 12 weeks after contract award, including the following:
1. BAS Hardware
    - a. Complete bill of materials indicating quantity, manufacturer, model number, and other relevant technical data.
    - b. Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation and maintenance instructions for items listed below and for other relevant items not listed below:
      - 1) DDC (controller) panels
      - 2) Transducers and transmitters
      - 3) Sensors (including accuracy data)
      - 4) Actuators
      - 5) Valves
      - 6) Dampers

- 7) Relays and switches
  - 8) Control panels
  - 9) Power supplies
  - 10) Batteries
  - 11) User interface equipment
  - 12) Wiring
  - c. Wiring diagrams and layouts for each control panel. Show all termination numbers.
  - d. Floor plan schematic diagrams indicating field sensor, controller and power supply locations.
2. Network and User interface Hardware and Software
- a. Complete bill of material indicating quantity, manufacturer, model number, and relevant technical data of equipment used.
  - b. Manufacturer's description and technical data, such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
    - 1) Central Processing Unit (CPU)
    - 2) Monitors
    - 3) Keyboards
    - 4) Power supply
    - 5) Battery backup
    - 6) Interface equipment between CPU and control panels
    - 7) Routers
    - 8) Repeaters
    - 9) Operating System software
    - 10) User interface software
    - 11) Color graphic software
    - 12) Third-party software
  - c. Schematic diagrams of control, communication, and power wiring for central system installation. Label cables and ports with computer manufacturers' model numbers and functions. Show all interface wiring to control system.
  - d. List of color graphics to be provided. Provide a conceptual layout of pictures and data for each graphic, showing or explaining which other graphics can be directly accessed.
3. Controlled Systems
- a. Riser diagrams showing control network layout, communication protocol, and wire types.
  - b. Schematic diagram of each controlled system. Label control points/objects with point/object names. Graphically show all locations of control elements.
  - c. Schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
  - d. Instrumentation list for each controlled system. List each control system element in a table format. Show element name, type of device, manufacturer, model number, and product data sheet number.
  - e. Mounting, wiring, and routing plan view drawing in 0.25 inch scale. Take into account HVAC, electrical and other systems' design and elevation requirements. Show locations of concrete pads and bases and special wall bracing for panels to accommodate this work.
  - f. Complete description of control system operation including sequences of operation. Include and reference a schematic diagram of system.
  - g. Point/object list for each system controller including inputs and outputs (I/O), point/object numbers, controlled device associated with each I/O point/object, and location of I/O device. Indicate alarmed and trended points/objects.
4. Description of process, report formats, and checklists to be used in Part 3: "Control System Demonstration and Acceptance."

5. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of BACnet controller (B-BC, B-AAC, B-AVAVC, B-ASC) and user interface (B-OWS).
  6. Instrumentation and Data Point Summary Table. Contractor shall submit in table format with the following information for each instrument and data point. The table is to be reviewed and approved by the owner's representative prior to hardware and software installation and programming.
    - a. Point name
    - b. Point description: provide building designation, system type, equipment type, engineering units, and functionality; include a description of its physical location
    - c. Expected range (upper and lower limit)
    - d. Instrumentation (as applicable): manufacturer, model number, range, and accuracy specification
    - e. Type
      - 1) AI: analog input
      - 2) BI: binary input
      - 3) NAI: network analog input
      - 4) NBI: network binary input
      - 5) P: programmed (e.g., soft or virtual point in control sequence such as a PID input or output)
      - 6) C: calculated value; a soft or virtual point. If calculated value, provide logic diagrams or code and any constants used in formula. If time-based integrated values are required, provide time periods: minutes, daily, weekly, monthly, and yearly. Also indicate if it is a running average.
    - f. Input resolution
    - g. Graphic display resolution
    - h. Data trend interval
    - i. Number of samples stored in local controller before transfer to host computer/server database
    - j. Data point address
- C. Schedules
1. Provide a Schedule of work within one month of contract award indicating:
    - a. Intended sequence of work items
    - b. Start date of each work item
    - c. Duration of each work item
    - d. Planned delivery dates for ordered material and equipment, and expected lead time
    - e. Milestones indicating possible restraints on work by other trades or situations
  2. Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.
- D. Project Record Documents. Submit three copies of record (as-built) documents upon completion of installation for approval prior to final completion. Submittal shall consist of:
1. Project Record Drawings.
    - a. As-built versions of the submittal shop drawings provided electronic PDF as 11 inches x 17 inches prints.
    - b. Submittals to include complete electrical point-to-point wiring diagrams, component layouts, system and equipment component sequences of operation, start-up and checkout procedures. Include a list of all unit default safety and control settings, whether fixed or adjustable, as shipped from the factory. Where field modifications are required to meet the specification, provide all modification labor and materials, and submit a complete, detailed, step-by-step procedure for the modifications.

2. Testing and Commissioning Reports and Checklists. Completed versions checklists and trend logs used to meet requirements of Part 3: "Control System Demonstration and Acceptance."
3. Operation and Maintenance (O & M) Manual.
  - a. As-built versions of the submittal product data.
  - b. Names, addresses, and 24-hour telephone numbers of installing contractors and service representatives for equipment and control systems.
  - c. User's manual with procedures for operating control systems: logging on and off, handling alarms, producing point/object reports, trending data, overriding computer control, and changing setpoints and variables.
  - d. Programming manual or set of manuals with description of the programming language and syntax of statements for algorithms and calculations used of point/object database creation and modification, of program creation and modification, and editor use.
  - e. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points/objects, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
  - f. Documentation of all programs created using custom programming language including setpoints, tuning parameters, and object database.
  - g. Graphic files, programs and database on magnetic or optical media.
  - h. List of recommended spare parts with part numbers and suppliers.
  - i. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware, including computer equipment and sensors.
  - j. Complete original-issue copies of furnished software, including operating systems, custom programming language, user interface software, and graphics software.
  - k. Licenses, guarantee, and warranty documents for equipment and systems.
  - l. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
4. Training Materials: Provide course outline and manuals for each class at least six weeks before the first class. Engineer will modify course outlines and manuals if necessary to meet Owner's needs. Engineer will review and approve course outlines and manuals at least three weeks before first class.

## 1.8 Warranty

- A. Warrant all work as follows:
  1. Warrant labor and materials for specified BAS free from defects for a period of 18 months after final acceptance. BAS failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. Respond during Owner's business hours within 24 hours of Owner's warranty service request.
  2. Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
  3. If Engineer determines that equipment and systems operate satisfactorily at the end of the final start-up, testing, and commissioning phase, Engineer will certify in writing that BAS operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.
  4. Provide updates to user user interface software, project-specific software, graphic software, database software, and firmware which resolve Contractor identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated

with above mentioned items. Do not install updates or upgrades without Owner's written authorization.

#### 1.9 Ownership of Proprietary Material

- A. Project specific software and documentation shall become Owner's property. This includes, but is not limited to:
  - 1. Graphics
  - 2. Record drawings
  - 3. Database
  - 4. Application programming code
  - 5. Documentation

### **PART 2 - PRODUCTS**

#### 2.1 Materials

- A. The equipment specified shall be provided as defined herein, shown on the drawings and as required to accomplish the sequences of control.
- B. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner or Owner's Representative. Spare parts shall be available for at least five-years after completion of this contract.

#### 2.2 BACnet Communications

- A. Control products, communication media, connectors, repeaters, hubs and routers shall comprise a BACnet BAS. Controllers and user interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
- B. Each controller shall have a communication port for connections to an user interface.
- C. Project drawings indicating remote buildings or sites to be connected to the Enterprise network shall allow for communication with each controller on the network as specified in Paragraph D.
- D. Network user interface and value passing shall be transparent to network architecture.
  - 1. A user interface connected to the BAS shall allow the user to interface with networked controllers as if directly connected. BAS information such as data, status, reports, system software, and custom programs, shall be viewable and editable from the user interface.
  - 2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be available on the network. Program and test all cross-controller links required to execute specified BAS operation. An authorized user shall be able to manage, maintain, and access the BAS network of controllers.
- E. Workstations, Building Control Panels and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clock daily from an user designated device via the network. The system shall automatically adjust for daylight saving and standard time as applicable.

- F. System shall be expandable to at least twice the required data points with additional controllers, associated devices, and wiring. Expansion shall not require user interface hardware additions or software revisions.
- G. BACnet Router. BACnet routers shall, at a minimum, implement the device requirements as specified as follows.
  - 1. A device that conforms to the BACnet protocol and contains an application layer shall:
    - a. contain exactly one Device object,
    - b. execute the ReadProperty service,
    - c. execute the Who-Has and Who-Is services (and thus initiate the I-Have and I-Am services) unless the device is an MS/TP slave device,
    - d. execute the WriteProperty service if the device executes the WritePropertyMultiple, AddListElement or RemoveListElement services,
    - e. allow the WriteProperty service to modify any properties that are modifiable by the AddListElement or RemoveListElement services,
    - f. execute the WriteProperty service if the device contains any objects with properties that are required to be writable,
    - g. have a configurable device instance that can take on any value across the range 0 .. 4194302, and
    - h. contain a Network Port object for each configured network port.

### 2.3 Graphical User Interface

- A. All Embedded Controller/Web Servers shall be accessed via a single connection to the Enterprise Network Server. In this configuration, each Embedded Controller/Web Server can be accessed from a PC using Thin-Client Remote Desktop Connection User Interface and/or a PC using Thin-Client Web Browser User Interface.
- B. The Thin-Client Remote Desktop Connection User Interface shall use any of the current versions of Windows Server with Remote Desktop Services and shall allow the Enterprise Server to host multiple, simultaneous client sessions. Remote Desktop shall use Remote Desktop Services technology to allow a single session to run remotely. A user shall connect to a Remote Desktop Session Host (RD Session Host) server by using Remote Desktop Connection (RDC) client software. Thin-client hardware devices running an embedded Windows-based operating system shall run the RDC client software to connect to the RD Session Host Enterprise Server.
- C. The Thin-Client Web Browser User Interface shall use any of the current versions of Microsoft Internet Explorer, Microsoft Edge, Mozilla Firefox, or Google Chrome browsers from any computer. The thin-client web browser shall be operating system agnostic, meaning it will support HTML5 enabled browsers without requiring proprietary user interface and configuration programs or browser plug-ins. Communication between the Thin-Client Web Browser User Interface and the Enterprise Network Server shall offer, at a minimum, encryption using 128-bit encryption technology within Secure Socket Layers (SSL). Communication protocol shall be Hyper-Text Transfer Protocol (HTTP).

- D. Software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system.
- E. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network. Systems employing a "flat" single tiered architecture shall not be acceptable.
  - 1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.
  - 2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote connected user interfaces.
- F. The user interface shall be completely interactive and shall provide a HTML5 experience that supports the following features as a minimum:
  - 1. Trending.
  - 2. Scheduling.
  - 3. Electrical demand limiting.
  - 4. Duty Cycling.
  - 5. Downloading Memory to field devices.
  - 6. Real time 'live' Graphic Programs.
  - 7. Tree Navigation.
  - 8. Parameter change of properties.
  - 9. Set point adjustments.
  - 10. Alarm / event information.
  - 11. Configuration of users.
  - 12. Execution of global commands.
  - 13. Add, delete, and modify graphics and displayed data.
- G. Software Components: All software shall be the most current version. All software components of the BAS software shall be provided and installed as part of this project. BAS software components shall include:
  - 1. Server Software, Database and Graphical User Interface.
  - 2. 5 Year Software Maintenance Agreement. Labor to implement shall be included.
  - 3. Embedded System Configuration Utilities for future modifications to the system and controllers.
  - 4. Embedded Graphical Programming Tools.
  - 5. Embedded Direct Digital Control software.
  - 6. Embedded Application Software.
  - 7. Embedded Native Function-block programming software and all controller "Setup Wizards".
- H. Login: On launching the user interface and selecting the appropriate domain name or IP address, the user shall be presented with a login page that will require a login name and strong password. Navigation in the system shall be dependent on the user's role-based application control privileges.
- I. Web Page Navigation: Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven user interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The GUI shall (as a minimum) provide for navigation, and



for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic set point controls, configuration menus for user access, reports and reporting actions for events.

- J. Tree Navigation: Navigation through the GUI shall be accomplished by clicking on the appropriate level of a navigation tree (consisting of an expandable and collapsible tree control like Microsoft's Explorer program) and/or by selecting dynamic links to other system graphics. Both the navigation tree and action pane shall be displayed simultaneously, enabling the user to select a specific system or equipment and view the corresponding graphic. The navigation tree shall as a minimum provide the following views: Geographic, Network, Groups and Configuration.
1. Geographic View shall display a logical geographic hierarchy of the system including: cities, sites, buildings, building systems, floors, equipment and objects.
  2. Groups View shall display Scheduled Groups and custom reports.
  3. Configuration View shall display all the configuration categories (Users, Schedule, Event, Reporting and Roles).
- K. Action Pane: The Action Pane shall provide several functional views for each subsystem specified. A functional view shall be accessed by clicking on the corresponding button:
1. Graphics: Using graphical format suitable for display in a web browser, graphics shall include aerial building/campus views, color building floor-plans, equipment drawings, active graphic set point controls, web content and other valid HTML elements. The data on each graphic page shall automatically refresh.
  2. Dashboards: User customizable data using drag and drop HTML5 elements. Shall include Web Charts, Gauges, and other custom developed widgets for web-browser. User shall have ability to save custom dashboards.
  3. Search: User shall have multiple options for searching data based upon Tags. Associated equipment, real time data, Properties, and Trends shall be available in result.
  4. Properties: Shall include graphic controls and text for the following: Locking or overriding objects, demand strategies, and any other valid data required for setup. Changes made to the properties pages shall require the user to depress an 'accept/cancel' button.
  5. Schedules: Shall be used to create, modify/edit and view schedules based on the systems hierarchy (using the navigation tree).
  6. Alarms: Shall be used to view alarm information geographically (using the navigation tree), acknowledge alarms, sort alarms by category, actions and verify reporting actions.
  7. Charting: Shall be used to display associated trend and historical data, modify colors, date range, axis and scaling. User shall have ability to create HTML charts through web browser without utilizing chart builder. User shall be able to drag and drop single or multiple data points, including schedules, and apply status colors for analysis.
  8. Logic - Live Graphic Programs: Shall be used to display 'live' graphic programs of the control algorithm, (micro block programming) for the mechanical/electrical system selected in the navigation tree.
  9. Other actions such as Print, Help, Command, and Logout shall be available via a drop-down window.
- L. Color Graphics: The GUI shall make extensive use of color in the graphic pane to communicate information related to set points and comfort. Animated .gifs or .jpg, vector scalable, active set point graphic controls shall be used to enhance usability. Graphics tools used to create graphics shall be non-proprietary and conform to the following basic criteria:
1. Display Size: The GUI user interface software shall graphically display in a minimum of 1024 by 768 pixels 24 bit True Color.

2. General Graphic: General area maps shall show locations of controlled buildings in relation to local landmarks.
  3. Color Floor Plans: Floor plan graphics shall show heating and cooling zones throughout the buildings in a range of colors, as selected by Owner. Provide a visual display of temperature relative to their respective set points. The colors shall be updated dynamically as a zone's actual comfort condition changes.
  4. Mechanical Components: Mechanical system graphics shall show the type of mechanical system components serving any zone through the use of a pictorial representation of components. Selected I/O points being controlled or monitored for each piece of equipment shall be displayed with the appropriate engineering units. Animation shall be used for rotation or moving mechanical components to enhance usability. .
  5. Minimum System Color Graphics: Color graphics shall be selected and displayed via a web browser for the following:
    - a. Each piece of equipment monitored or controlled including each terminal unit.
    - b. Each building.
    - c. Each floor and zone controlled.
- M. Hierarchical Schedules: Utilizing the Navigation Tree displayed in the GUI, a user (with proper access credentials) shall be able to define a Normal, Holiday or Override schedule for an individual piece of equipment or room, or choose to apply a hierarchical schedule to the entire system, site or floor area. For example, Independence Day ' Holiday' for every level in the system would be created by clicking at the top of the geographic hierarchy defined in the Navigation Tree. No further user intervention would be required and every control module in the system with would be automatically downloaded with the ' Independence Day' Holiday. All schedules that affect the system/area/equipment highlighted in the Navigation Tree shall be shown in a summary schedule table and graph.
1. Schedules: Schedules shall comply with the BACnet standards, (Schedule Object, Calendar Object, Weekly Schedule property and Exception Schedule property) and shall allow events to be scheduled based on:
    - a. Types of schedule shall be Normal, Holiday or Override.
    - b. A specific date.
    - c. A range of dates.
    - d. Any combination of Month of Year (1-12, any), Week of Month (1-5, last, any), Day of Week (M-Sun, Any).
    - e. Wildcard (example, allow combinations like second Tuesday of every month).
  2. Schedule Categories: The system shall allow users to define and edit scheduling categories (different types of "things" to be scheduled; for example, lighting, HVAC occupancy, etc.). The categories shall include: name, description, icon (to display in the hierarchy tree when icon option is selected) and type of value to be scheduled.
  3. Schedule Groups: In addition to hierarchical scheduling, users shall be able to define functional Schedule Groups, comprised of an arbitrary group of areas/rooms/equipment scattered throughout the facility and site. For example, the user shall be able to define an ' individual tenant' group - who may occupy different areas within a building or buildings. Schedules applied to the ' tenant group' shall automatically be downloaded to control modules affecting spaces occupied by the ' tenant group'.
  4. Intelligent Scheduling: The control system shall be intelligent enough to automatically turn on any supporting equipment needed to control the environment in an occupied space. If the user schedules an individual room in a VAV system for occupancy, for example, the control logic shall automatically turn on the VAV air handling unit, chiller, boiler and/or any other equipment required to maintain the specified comfort and environmental conditions within the room.

5. Partial Day Exceptions: Schedule events shall be able to accommodate a time range specified by the user (ex: board meeting from 6 pm to 9 pm overrides Normal schedule for conference room).
6. Schedule Summary Graph: The schedule summary graph shall clearly show Normal versus Holiday versus Override Schedules and the net operating schedule that results from all contributing schedules. Note: In case of priority conflict between schedules at the different geographic hierarchy, the schedule for the more detailed geographic level shall apply.

N. Alarms:

1. Alarm Processing. Any object in the system shall be configurable to alarm in and out of normal state. The operator shall be able to configure the alarm limits, alarm limit differentials, states, and reactions for each object in the system.
2. Alarm Messages. Alarm messages shall use the English language descriptor for the object in alarm in such a way that the operator will be able to recognize the source, location, and nature of the alarm without relying upon acronyms or other mnemonics.
3. Alarm Reactions. The operator shall be able to determine (by object) what, if any, actions are to be taken during an alarm. Actions shall include logging, printing, starting programs, displaying messages, dialing out to remote stations, paging, providing audible annunciation, or displaying specific system graphics. Each of these actions shall be configurable by workstation and time of day.
4. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
5. Alarms associated with a specific system, area, or equipment selected in the Navigation Tree, shall be displayed in the Action Pane by selecting an ' Alarms' view. Alarms, and reporting actions shall have the following capabilities:
  - a. Alarms View: Each Alarm shall display an Alarms Category (using a different icon for each alarm category), date/time of occurrence, current status, alarm report and a bold URL link to the associated graphic for the selected system, area or equipment. The URL link shall indicate the system location, address and other pertinent information. An user shall easily be able to sort events, edit event templates and categories, acknowledge or force a return to normal in the Events View as specified in this section.
  - b. Alarm Categories: The user shall be able to create, edit or delete alarm categories such as HVAC, Maintenance, Fire, or Generator. An icon shall be associated with each alarm category, enabling the user to easily sort through multiple events displayed.
  - c. Alarm Templates: Alarm template shall define different types of alarms and their associated properties. As a minimum, properties shall include a reference name, verbose description, severity of alarm, acknowledgement requirements, and high/low limit and out of range information.
  - d. Alarm Areas: Alarm Areas enable an user to assign specific Alarm Categories to specific Alarm Reporting Actions. For example, it shall be possible for an user to assign all HVAC Maintenance Alarm on the 1st floor of a building to email the technician responsible for maintenance. The Navigation Tree shall be used to setup Alarm Areas in the Graphic Pane.
  - e. Alarm Time/Date Stamp: All events shall be generated at the DDC control module level and comprise the Time/Date Stamp using the standalone control module time and date.
  - f. Alarm Configuration: Users shall be able to define the type of Alarm generated per object. A ' network' view of the Navigation Tree shall expose all objects and their

- respective Alarm Configuration. Configuration shall include assignment of Alarm, type of Acknowledgement and notification for return to normal or fault status.
- g. Alarm Summary Counter: The view of Alarm in the Graphic Pane shall provide a numeric counter, indicating how many Alarms are active (in alarm), require acknowledgement and total number of Alarms in the BAS Server database.
  - h. Alarm Auto-Deletion: Alarms that are acknowledged and closed shall be auto-deleted from the database and archived to a text file after an user defined period.
  - i. Alarm Reporting Actions: Alarm Reporting Actions specified shall be automatically launched (under certain conditions) after an Alarm is received by the BAS server software. Users shall be able to easily define these Reporting Actions using the Navigation Tree and Graphic Pane through the web browser GUI. Reporting Actions shall be as follows:
    - 1) Print: Alarm information shall be printed to the BAS server's PC or a networked printer.
    - 2) Email: Email shall be sent via any POP3-compatible e-mail server (most Internet Service Providers use POP3). Email messages may be copied to several email accounts. Note: Email reporting action shall also be used to support alphanumeric paging services, where email servers support pagers.
    - 3) File Write: The ASCII File write reporting action shall enable the user to append user defined alarm information to any alarm through a text file. The alarm information that is written to the file shall be completely definable by the user. The user may enter text or attach other data point information (such as AHU discharge temperature and fan condition upon a high room temperature alarm).
    - 4) Write Property: The write property reporting action updates a property value in a hardware module.
    - 5) SNMP: The Simple Network Management Protocol (SNMP) reporting action sends an SNMP trap to a network in response to receiving an alarm.
    - 6) Run External Program: The Run External Program reporting action launches specified program in response to an event.
  - j. There shall be 4 levels of alarm
    - 1) Level 1: Life-safety message
    - 2) Level 2: Critical equipment message
    - 3) Level 3: Urgent message
    - 4) Level 4: Normal message
  - k. Maintenance Mode. Operators shall have the ability to put any device in/out of maintenance mode.
    - 1) All 1) All alarms associated with a device in maintenance mode will be suppressed except life safety alarms.
    - 2) If a device is in maintenance mode, issue a daily Level 3 alarm at a scheduled time indicating that the device is still in maintenance mode.
  - l. Entry Delays. All alarms shall have an adjustable delay time such that the alarm is not triggered unless the alarm condition is TRUE for the delay time. Default entry delays are as follows:
    - 1) Level 1 alarms: 1 seconds
    - 2) Level 2 alarms: 10 seconds
    - 3) Level 3 alarms: 1 minutes
    - 4) Level 4 alarms: 5 minutes
  - m. Exit Hysteresis
    - 1) Each alarm shall have an adjustable time-based hysteresis (default: 5 seconds) to exit the alarm. Once set, the alarm does not return to normal until the alarm conditions have ceased for the duration of the hysteresis.
    - 2) Each analog alarm shall have an adjustable percent-of-limit-based hysteresis (default: 0% of the alarm threshold, i.e., no hysteresis; alarm exits at the same value as the alarm threshold) the alarmed variable required to exit the alarm.

- Alarm conditions have ceased when the alarmed variable is below the triggering threshold by the amount of the hysteresis.
- n. Latching. Any alarm can be configured as latching or nonlatching. A latching alarm requires acknowledgment from the operators before it can return to normal, even if the exit deadband has been met. A nonlatching alarm does not require acknowledgment. Default latching status is as follows:
    - 1) Level 1 alarms: latching
    - 2) Level 2 alarms: latching
    - 3) Level 3 alarms: nonlatching
    - 4) Level 4 alarms: nonlatching
  - o. Postexist. Suppression Period. To limit alarms, any alarm may have an adjustable suppression period such that, if the alarm is triggered, its postsuppression timer is triggered and the alarm may not trigger again until the postsuppression timer has expired. Default suppression periods are as follows:
    - 1) Level 1 alarms: 0 minutes
    - 2) Level 2 alarms: 5 minutes
    - 3) Level 3 alarms: 24 hours
    - 4) Level 4 alarms: 7 days
  - p. For both latching and nonlatching alarms, the operators may acknowledge the alarm. Acknowledging an alarm clears the alarm, the exit deadband, and suppression period. A device can go right back into alarm as soon as the entry delay elapses.
- O. Trends: As system is engineered, all points shall be enabled to trend. Trends shall both be displayed and user configurable through the Web Browser GUI. Trends shall comprise analog, digital or calculated points simultaneously. A trend log's properties shall be editable using the Navigation Tree and Graphic Pane.
- 1. Viewing Trends: The user shall have the ability to view trends by using the Navigation Tree and selecting a Trends button in the Graphic Pane. The system shall allow y- and x-axis maximum ranges to be specified and shall be able to simultaneously graphically display multiple trends per graph.
  - 2. Local Trends: Trend data shall be collected locally by Multi-Equipment/Single Equipment general-purpose controllers, and periodically uploaded to the BAS server if historical trending is enabled for the object. Trend data, including run time hours and start time date shall be retained in non-volatile module memory. Systems that rely on a gateway/router to run trends are NOT acceptable.
  - 3. Resolution. Sample intervals shall be as small as one second. Each trended point will have the ability to be trended at a different trend interval. When multiple points are selected for displays that have different trend intervals, the system will automatically scale the axis.
  - 4. Dynamic Update. Trends shall be able to dynamically update at user-defined intervals.
  - 5. Zoom/Pan. It shall be possible to zoom-in on a particular section of a trend for more detailed examination and 'pan through' historical data by simply scrolling the mouse.
  - 6. Numeric Value Display. It shall be possible to pick any sample on a trend and have the numerical value displayed.
  - 7. Copy/Paste. The user shall have the ability to pan through a historical trend and copy the data viewed to the clipboard using standard keystrokes (i.e. CTRL+C, CTRL+V).
  - 8. Group Trend Time Series Plots
    - a. Provide user-selectable Y points.
    - b. Provide user-editable titles, point names, and Y axis titles.
    - c. Individual trended points shall be able to be grouped in groups of up to four points per plot with up to four plots per page.
  - 9. X-Y Trend Plots

- a. User- selectable X and Y trend inputs.
  - b. User- editable titles, point names, and X and Y axis titles.
  - c. User- selectable time period options:
    - 1) A 1-day 24-hour period;
    - 2) A 1-week 7-day period;
    - 3) A 1-month period, with appropriate days for the month selected; or (4) a 1-year period.
    - 4) The user shall be able to select the beginning and ending period for each X-Y chart, within the time domain of the database being used.
  - d. User- selectable display of up to 6 plots per screen in 2 columns.
- P. Reports and Logs. Provide a reporting package that allows the operator to select, modify, or create reports. Each report shall be definable as to data content, format, interval, and date. Report data shall be archivable on the hard disk for historical reporting. Provide the ability for the operator to obtain real-time logs of all objects by type or status (e.g., alarm, lockout, normal). Reports and logs shall be stored on the Enterprise Server hard disk in a format that is readily accessible by other standard software applications, including spreadsheets and word processing.
- Q. Custom Reports. Provide the capability for the operator to easily define any system data into a daily, weekly, monthly, or annual report. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. These reports shall be time and date stamped and shall contain a report title and the name of the facility.
- R. Security Access: Systems that access from the web browser GUI to BAS server shall require a Login Name and Strong Password. Access to different areas of the BAS system shall be defined in terms of Role-Based Access Control privileges as specified:
- 1. Roles: Roles shall reflect the actual roles of different types of users. Each role shall comprise a set of 'easily understood English language' privileges. Roles shall be defined in terms of View, Edit and Function Privileges.
    - a. View Privileges shall comprise: Navigation, Network, and Configuration Trees, Users, Roles and Privileges, Alarm/Event Template and Reporting Action.
    - b. Edit Privileges shall comprise: Set point, Tuning and Logic, Manual Override, and Point Assignment Parameters.
    - c. Function Privileges shall comprise: Alarm/Event Acknowledgement, Control Module Memory Download, Upload, Schedules, Schedule Groups, Manual Commands, Print and Alarm/Event Maintenance.
- S. Geographic Assignment of Roles: Roles shall be geographically assigned using a similar expandable/collapsible navigation tree. For example, it shall be possible to assign two HVAC Technicians with similar competencies (and the same user defined HVAC Role) to different areas of the system.
- T. The system software shall include a Graphic Programming Language (GPL) for all DDC control algorithms resident in all control modules. Any system that does not use a drag and drop method of graphical icon programming shall not be accepted. All systems shall use a GPL method used to create a sequence of operations by assembling graphic microblocks that represent each of the commands or functions necessary to complete a control sequence. Microblocks represent common logical control devices used in conventional control systems, such as relays, switches, high signal selectors etc., in addition to the more complex DDC and energy management strategies such as PID loops and optimum start. Each microblock shall

be interactive and contain the programming necessary to execute the function of the device it represents.

- U. Graphic programming shall be performed while on screen and using a mouse; each microblock shall be selected from a microblock library and assembled with other microblocks necessary to complete the specified sequence. Microblocks are then interconnected on screen using graphic "wires," each forming a logical connection. Once assembled, each logical grouping of microblocks and their interconnecting wires then forms a graphic function block which may be used to control any piece of equipment with a similar point configuration and sequence of operation.
- V. Graphic Sequence: The clarity of the graphic sequence shall be such that the user has the ability to verify that system programming meets the specifications, without having to learn or interpret a manufacturer's unique programming language. The graphic programming shall be self-documenting and provide the user with an understandable and exact representation of each sequence of operation.
- W. GPL Capabilities: The following is a minimum definition of the capabilities of the Graphic Programming software:
  - 1. Function Block (FB): Shall be a collection of points, microblocks and wires which have been connected together for the specific purpose of controlling a piece of HVAC equipment or a single mechanical system.
  - 2. Logical I/O: Input/Output points shall interface with the control modules in order to read various signals and/or values or to transmit signal or values to controlled devices.
  - 3. Microblocks: Shall be software devices that are represented graphically and may be connected together to perform a specified sequence. A library of microblocks shall be submitted with the control contractors bid.
  - 4. Wires: Shall be Graphical elements used to form logical connections between microblocks and between logical I/O.
  - 5. Reference Labels: Labels shall be similar to wires in that they are used to form logical connections between two points. Labels shall form a connection by reference instead of a visual connection, i.e. two points labeled 'A' on a drawing are logically connected even though there is no wire between them.
  - 6. Parameter: A parameter shall be a value that may be tied to the input of a microblock.
  - 7. Properties: Dialog boxes shall appear after a microblock has been inserted which has editable parameters associated with it. Default parameter dialog boxes shall contain various editable and non-editable fields, and shall contain 'push buttons' for the purpose of selecting default parameter settings.
  - 8. Icon: An icon shall be graphic representation of a software program. Each graphic microblock has an icon associated with it that graphically describes its function.
  - 9. Menu-bar Icon: Shall be an icon that is displayed on the menu bar on the GPL screen, which represents its associated graphic microblock.
- X. Live Graphical Programs: The Graphic Programming software shall support a 'live' mode, where all input/output data, calculated data and set points shall be displayed in a 'live' real-time mode.

#### 2.4 BACnet Advanced Variable Air Volume Controller (B-AVAVC)

- A. General. Provide an adequate number of BACnet Advanced Variable Air Volume Controller (B-AVAVC) to achieve the performance specified in the Part 1 Article on "System Performance". B-AVAVC shall provide microprocessor based self-contained stand-alone fully programmable operation of local process control loops. The controller platform shall provide

options and advanced system functions, programmable and configurable, that allow standard and customizable control solutions required in executing the "Sequence of Operation". All local level application programs shall be installed on individual controllers in non-volatile memory. Control systems that utilize 'canned' programs or programmable read only memory (PROM) level application programming are not acceptable. Each of these controllers shall meet the following requirements.

1. The B-AVAVC shall have sufficient memory to support its operating system, database, and programming requirements.
2. Data shall be shared between networked B-AVAVCs.
3. The operating system of the controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.
4. Controllers that perform scheduling shall have a real-time clock.
5. The B-AVAVC shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
  - a. Assume a predetermined failure mode,
  - b. Generate an alarm notification.
6. The B-AVAVC shall communicate with other BACnet devices on the network using protocol specific services.
7. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.
8. The controller shall have Significant Event Notification, Periodic Update capability and Failure Detect when network inputs fail to be detected within their configurable time frame.
9. Provide 9. Provide documentation for each device, with the following information:
  - a. BACnet Device; MAC address, name, type and instance number,
  - b. BACnet Objects; name, type and instance number.
  - c. The controller shall have an internal velocity pressure sensor.
  - d. The controller shall have an integrated or remote actuator.

B. Communication

1. Each B-AVAVC shall reside on a BACnet network using the MS/TP or Ethernet Data Link/ Physical layer protocol.
2. Each B-AVAVC shall provide a service communication port using BACnet Data Link/Physical layer protocol for connection to a portable operator's terminal.

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 32 degrees F to 150 degrees F and 10 to 90 percent RH.
2. Controllers used in conditioned space shall be mounted in dust proof enclosures, and shall be rated for operation at 32 degrees F to 120 degrees F.

D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

E. Memory. The B-AVAVC shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.



- F. Immunity to power and noise. Controller shall be able to operate at 90 percent to 110 percent of nominal voltage rating and shall perform an orderly shutdown below 80 percent nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 ft.
- G. 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.

## 2.5 BACnet Application Specific Controller (B-ASC)

- A. General. BACnet Application Specific Controllers (B-ASCs) are microprocessor-based BAS controllers which through hardware or firmware design are dedicated to control a specific piece of equipment. They are not fully user-programmable, but are customized for operation within the confines of the equipment they are designed to serve. B-ASCs may not be used for complex sequences of operation. B-ASCs shall communicate with other BACnet devices on the network using the Read (Execute) Property service as defined in Clause 15.5 of ASHRAE Standard 135. Each B-ASCs shall be certified or listed for compliance to the BACnet standards.
  - 1. Each B-ASC shall be capable of stand-alone operation and shall continue to provide control functions without being connected to the network
  - 2. Each B-ASC will contain sufficient I/O capacity to control the target system.
  - 3. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.
  - 4. Provide documentation for each device, with the following information:
    - a. BACnet Device; MAC address, name, type and instance number,
    - b. BACnet Objects; name, type and instance number.
- B. Communication
  - 1. Each controller shall reside on a BACnet network using the MS/TP or Ethernet Data Link/Physical layer protocol. Each network of controllers shall be connected to one building controller.
  - 2. Each controller shall have a BACnet Data Link/Physical layer compatible connection for a laptop computer or a portable user's tool. This connection shall be extended to a space temperature sensor port where shown and allow access to the entire network.
  - 3. Each controller shall have a secondary sub network for communicating sensors or I/O expansion modules.
- C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
  - 1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 32 degrees F to 150 degrees F and 10 to 90 percent RH.
  - 2. Controllers used in conditioned space shall be mounted in dust proof enclosures, and shall be rated for operation at 32 degrees F to 120 degrees F.
- D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.

- E. Memory. The application specific controller shall use nonvolatile memory and maintain all BIOS and programming information in the event of a power loss.
- F. Immunity to power and noise. Controller shall be able to operate at 90 percent to 110 percent of nominal voltage rating and shall perform an orderly shutdown below 80 percent nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 ft.
- G. Transformer. Power supply for the ASC must be rated at a minimum of 125 percent of ASC power consumption and shall be of the fused or current limiting type.
- H. 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.

## 2.6 MODBUS System Integration

- A. The BAS shall support the integration of device data from MODBUS RTU, ACSII, or TCP control system devices. The connection to the MODBUS system shall be via an RS-232, RS485, or Ethernet IP as required by the device.
  - 1. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of the MODBUS system data into the FPMS. Objects provided shall include at a minimum:
    - 2. Read/Write MODBUS AI Registers
    - 3. Read/Write MODBUS AO Registers
    - 4. Read/Write MODBUS BI Registers
    - 5. Read/Write MODBUS BO Registers
- B. All scheduling, alarming, logging and global supervisory control functions, of the MODBUS system devices, shall be performed by the Network Area Controller.
- C. The BAS supplier shall provide a MODBUS system communications driver. The equipment system vendor that provided the equipment utilizing MODBUS shall provide documentation of the system's MODBUS interface and shall provide factory support at no charge during system commissioning.

## 2.7 Input/Output Interface

- A. Hardwired inputs and outputs may tie into the BAS through building, advanced application, or application specific controllers.
- B. All input and output points shall be protected such that shorting of the point to itself, to another point, or to ground, shall cause no damage to the controller. All input and output points shall be protected from voltage up to 24 volts of any duration, such that contact with this voltage will cause no damage to the controller.
- C. Binary inputs shall allow the monitoring of ON/OFF signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense "dry contact" closure without external power (other than that provided by the controller) being applied.

- D. Pulse accumulation input objects. This type of object shall conform to all the requirements of binary input objects and also accept up to 10 pulses per second for pulse accumulation.
- E. Analog inputs shall allow the monitoring of low-voltage (0-10 VDC), current (4-20 mA), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with – and field configurable to – commonly available sensing devices.
- F. Binary outputs shall provide for ON/OFF operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on building and advanced application controllers shall have three-position (On/Off/Auto) override switches, and status lights. Outputs shall be selectable for either normally open or normally closed operation.
- G. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10 VDC signal or a 4 to 20 mA signal as required to provide proper control of the output device. Analog outputs on building or advanced application controllers shall have status lights and a two-position (AUTO/MANUAL) switch and manually adjustable potentiometer for manual override. Analog outputs shall not exhibit a drift of greater than 0.4 percent of range per year.
- H. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct mounted heating coils, zone dampers, radiation, etc.) Control algorithms shall run the zone actuator to one end of its stroke once every 24 hours for verification of user tracking.
- I. Input/Output points shall be universal type, i.e., controller input or output may be designated (in software) as either a binary or analog type point with appropriate properties. Application specific controllers are exempted from this requirement.
- J. System Capacity. The system size shall be expandable to at least twice the number of input/output objects/points required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The user interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.
- K. Each controlled device or function shall be a separate output of the digital controller (i.e., Economizer, Heating Valve, Cooling Valve are three (3) separate output points). When a points' list is provided the greater number of points and their configuration shall govern. Multiplexers or programmable logic controllers utilized with digital controller input and output points to expend the digital controller I/O capabilities will not be allowed.

### **PART 3 - EXECUTION**

#### **3.1 Examination**

- A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started.
- B. Inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started.

- C. Examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate or if any discrepancies occur between the plans and the Contractor's work and the plans and the work of others, then report these discrepancies to the Engineer and obtain written instructions for any changes necessary to accommodate the temperature control work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect to report such discrepancies shall be made by and the costs borne by this Contractor.

### 3.2 Protection

- A. Protect all work and material from damage by their work or employees, and shall be liable for all damage thus caused.
- B. The installing contractor shall be responsible for their work and equipment until finally inspected, tested, and accepted. Protect any material that is not immediately installed. Close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

### 3.3 Coordination

#### A. Site

1. Where the temperature control work will be installed in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. If temperature control work is installed before coordinating with other trades, so as to cause any interference with work of other trades, the temperature control work shall be re-worked to correct the condition without extra charge.
2. Coordinate and schedule work with all other work in the same area, or with work which is dependent upon other work, to facilitate mutual progress.

#### B. Test and Balance

1. Furnish all tools necessary to interface to the control system for test and balance purposes.
2. Provide training in the use of these tools. This training will be planned for a minimum of 4 hours.
3. In addition provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
4. The tools used during the test and balance process will be returned at the completion of the testing and balancing.

- C. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated as follows:

1. All communication media and equipment shall be provided as specified in Part 2: "Communication" of this specification.
2. Each supplier of controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.
3. Coordinate and resolve any incompatibility issues that arise between the control products provided under this Section and those provided under other sections or divisions of this specification.

- D. Revise equipment tagging and nomenclature, room numbering, etc. to reflect as-built conditions or an Owner's preference for integration into their existing naming numbering convention.

### 3.4 Field Quality Control

- A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this specification.
- B. Continually monitor the field installation for code compliance and quality of workmanship.
- C. Have work inspected by authorities having jurisdiction over the work.

### 3.5 Controllers

- A. Provide a separate controller for each terminal unit, and other unitary equipment and HVAC systems. A DDC controller may control more than one system provided that all points/objects associated with the system are assigned to the same DDC controller. Points/objects used for control loop reset such as outside air or space temperature are exempt from this requirement.
- B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of 15 percent spare I/O point/object capacity for each point/object type found at each location. If input /objects are not universal, 15 percent of each type is required. If outputs are not universal, 15 percent of each type is required. A minimum of one spare is required for each type of point/object used.
  - 1. Future use of spare capacity shall require providing the field device, field wiring, point/object database definition, and custom software. No additional controller boards or point/object modules shall be required to implement use of these spare points.

### 3.6 Programming

- A. Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25 percent of available memory free for future use.
- B. Point/object Naming: System point/object names shall be modular in design, allowing easy user interface without the use of a written point/object index. Use the following naming convention:  
AAABBBCCCDDDEEE where:

AAA is used to designate the location of the point/object within the building such as mechanical room, wing, or level, or the building itself in a multi-building environment.

BBB is used to designate the mechanical system with which the point/object is associated (e.g., A01, HTG, CLG, LTG).

CCC represents the equipment or material referenced (e.g., SAF for supply air fan, EXF for exhaust fan, RAF for return air fan).

D or DD or DDD may be used for clarification or for identification if more than one of CCC exists (e.g., SAF10, EXF121).

EE represents the action or state of the equipment or medium (e.g., T for temperature, RH for humidity, CO for control, S for status, D for damper control, I for current).

C. Software Programming

1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
  - a. Text-based:
    - 1) must provide actions for all possible situations
    - 2) must be modular and structured
    - 3) must be commented
  - b. Graphic-based
    - 1) must provide actions for all possible situations
    - 2) must be documented
  - c. Parameter-based
    - 1) must provide actions for all possible situations
    - 2) must be documented
2. After submittal and review of control software, offer to schedule a meeting with the Engineer and Commissioning Agent (CxA) to review system function.

D. Graphical User Interface

1. Standard Graphics. Provide graphics for all controlled systems and floor plans of the building. Point/object information on the graphic displays shall dynamically update. Show on each graphic all input and output points/objects for the system. Also show relevant calculated points/objects such as setpoints.
2. Show terminal equipment information on a "graphic" summary table. Provide dynamic information for each point/object show.
3. Provide all the labor necessary to install, initialize, start up, and troubleshoot all user interface software and their functions as described in this section. This includes any operating system software, the user interface database, and any third-party software installation and integration required for successful operation of the user interface.
4. Provide graphic representation of each system. Graphic shall have a link to its respective approved as-built sequence of operation in portable document format (pdf) or hypertext markup language format (html).
5. Provide graphic representation of each control device component (sensor, controller, controlled device). Each control device component graphic representation shall have a cursor-hover-over pull-down box with links to the manufacturer's data sheet, installation instructions, maintenance instructions, and programming instructions literature in portable document format (pdf) or hypertext markup language format (html). Also, provide a link to an active trend of sensor and controlled device components.
6. Provide graphic representation of each equipment component (pump, boiler, chiller, air handling unit, etc.). Each equipment component shall have a cursor-hover-over pull-down box with links to the manufacturer's data sheet, installation, maintenance, and programming literature in portable document format (pdf) or hypertext markup language format (html). For equipment components with factory mounted controllers provide an additional link to a graphic representation of all equipment controller data available via the respective communication protocol interface in tabular format.
7. The BAS Contractor shall initially prepare and be responsible for a Graphical User Interface Development Plan. The plan shall describe the process for the development of the GUI.
8. GUI Scope Meeting: Within 45 days from execution of the Contract, participate in a scope meeting with the GUI Development Team chaired by the BAS Contractor. The

purpose of the meeting includes a review of the GUI Development Plan with discussions of development schedule, graphical requirements, and assignments of responsibilities.

9. GUI Coordination Meetings: The GUI Development Team members will meet on a predetermined and approved basis (by the Owner) to review progress on the GUI work, coordinate scheduling conflicts, and to discuss strategies and processes for upcoming tasks. The meetings will be chaired by the BAS Contractor. Allow for 80 hours of meeting time.
10. GUI Development Meeting Minutes: The BAS Contractor shall prepare minutes of the initial scope and progress meetings, and shall include a copy of the agenda, and identify location and date of the meeting, and individuals in attendance. Minutes shall be distributed to members of the GUI Development Team.
11. GUI Development Team: Members of the GUI Development Team shall include, but not be limited to the Owner, BAS Contractor, and such parties designated by the Owner or BAS Contractor.

### 3.7 Control System Checkout and Testing

- A. Start-up Testing: All testing listed in this article shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's Representative is notified of the system demonstration.
  1. Upon completion of the control system, adjust all components of the system. Make all adjustments in the control system required and as directed by the balancer to achieve the desired air balance quantities. All instruments shall be carefully calibrated and each control function shall be demonstrated to function properly, to the satisfaction of the Engineer and the Owner. Provide a complete instruction manual covering the function and operation of all components. At the time of demonstration, each function shall be simulated to ensure that controls respond properly to all signals, and the Owner shall be instructed in the proper operation of the system.
  2. Furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
  3. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
  4. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations.
  5. Verify that all binary output devices (relays, solenoid valves, two position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
  6. Verify that all analog output devices (transducers, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. Check all control valves and automatic dampers to ensure proper action and closure. Make any necessary adjustments to valve stem and damper blade travel.
  7. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.
  8. Alarms and Interlocks
    - a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    - b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    - c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.
  9. Each unit and associated controls, safeties and wiring shall be checked out, started and adjusted by a factory trained service technician. Submit a startup report including a list of

all unit safety and control settings, whether fixed or adjustable, as field checked and setup per the specified design conditions five days after unit startup. Submit service technician certification upon request.

### 3.8 Control System Demonstration and Acceptance

#### A. Demonstration

1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the temperature controls have been completed, started up and performed its own tests.
2. The tests described in this section are to be performed in addition to the tests that are performed as a necessary part of the installation, startup, and debugging process and as specified in the "Control System Checkout and Testing" Article in Part 3 of this specification. The Engineer may be present to observe and review these tests. The Engineer shall be notified at least 10 days in advance of the start of the testing procedures.
3. The demonstration process shall follow that approved in Part 1: "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration.
4. Provide at least two persons equipped with two way communication, and demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. Provide and operate any test equipment required to prove the proper operation.
5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
6. Demonstrate compliance with Part 1: "System Performance.
7. Demonstrate compliance with Sequences of Operation through all modes of operation.
8. Demonstrate complete operation of User Interface.
9. Additionally, the following items shall be demonstrated:
  - a. Optimum Start. Supply a trend data output showing the capability of the algorithm. The hour by hour trends shall include the output status of all optimally started equipment, as well as temperature sensor inputs of affected areas.
  - b. Interface to the building fire alarm system.
  - c. Operational logs for each system that indicate all setpoints, operating points, valve positions, mode, and equipment status shall be submitted to the Engineer. These logs shall cover three 48 hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
10. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date, and any necessary repairs or revisions to the hardware or software to successfully complete all tests shall be made.

#### B. Acceptance

1. All tests described in this specification shall have been performed to the satisfaction of both the Engineer and Owner prior to the acceptance of the control system as meeting the requirements of Completion. Any tests that cannot be performed due to circumstances beyond the control of the contractor may be exempt from the Completion requirements if stated as such in writing by the Engineer. Such tests shall then be performed as part of the warranty.
2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1: Submittals.



- C. During the first year of operation, after acceptance by the Owner, provide complete service to adjust or assist the Owner in adjusting the equipment to obtain optimum performance from the control equipment and from the heating and air conditioning systems in general. This shall be done without additional expense to the Owner. This work shall include revisions to DDC software programs and controller, and all PC front end software upgrades. All software shall be provided to the Owner in disk form, including back-ups of final field programs.

### 3.9 Cleaning

- A. Clean up all debris resulting from its activities daily. Remove all cartons, containers, crates, etc., under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.
- B. At the completion of work in any area, clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.
- C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

### 3.10 Training

- A. Provide a minimum of one onsite training classes 8 hours in length during the construction period for personnel designated by the owner.
- B. Provide one additional training sessions at 6 and 12 months following building's turnover. Each session shall be 4 hrs. in length and must be coordinated with the building Owner.
- C. Train the designated staff of Owner's Representative and Owner to enable them to:
  - 1. Day-to-day Users:
    - a. Proficiently operate the system
    - b. Understand control system architecture and configuration
    - c. Understand DDC system components
    - d. Understand system operation, including DDC system control and optimizing routines (algorithms)
    - e. Operate the user interface and peripherals
    - f. Log on and off the system
    - g. Access graphics, point/object reports, and logs
    - h. Adjust and change system setpoints, time schedules, and holiday schedules
    - i. Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
    - j. Understand system drawings, and Operation and Maintenance manual
    - k. Understand the job layout and location of control components
    - l. Access data from DDC controllers
    - m. Operate portable operator's terminals
  - 2. Advanced Users:
    - a. Make and change graphics on the user interface
    - b. Create, delete, and modify alarms, including annunciation and routing of these
    - c. Create, delete, and modify point/object trend logs, and graph or print these
    - d. Create, delete, and modify reports
    - e. Add, remove, and modify system's physical points/objects
    - f. Create, modify, and delete programming

- g. Add panels when required
  - h. Add user interface stations
  - i. Create, delete, and modify system displays — both graphical and otherwise
  - j. Perform BAS system field checkout procedures
  - k. Perform DDC controller unit operation and maintenance procedures
  - l. Perform user interface and peripheral operation and maintenance procedures
  - m. Perform BAS system diagnostic procedures
  - n. Configure hardware including PC boards, switches, communication, and I/O points/objects
  - o. Maintain, calibrate, troubleshoot, diagnose, and repair hardware
  - p. Adjust, calibrate, and replace system components
3. System Managers/Administrators:
- a. Maintain software and prepare backups
  - b. Interface with job-specific, third-party user software
  - c. Add new users and understand password security procedures
- D. Provide course outline and materials as per “Submittals” Article in Part 1 of this specification. The instructor(s) shall provide one copy of training material per student.
- E. The instructor(s) shall be factory-trained instructors experienced in presenting this material.
- F. Classroom training shall be done using a network of working controllers representative of the installed hardware.
- 3.11 Outdoor temperature and humidity sensors shall be mounted on the north face of the building unless otherwise approved by the Engineer. Exact location shall be approved by the Architect.
- 3.12 In addition to the adjustments and fine tuning, include as a part of this contract the equivalent of two (2) man days of service technician and/or programming time for work as may be specified by the Engineer.

END OF SECTION

**23 09 25 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC**

**PART 1 - GENERAL**

- 1.1 This section describes all sensors, controllers, instruments, valves, actuators, devices, for use with the control system specified in Section 23 09 23 Building Automation System (BAS) for HVAC. All control devices (valves, dampers, actuators, etc.) shall be included.
- 1.2 Refer to the HVAC Drawings, Section 23 09 23 Building Automation System (BAS) for HVAC, Section 23 09 93 Sequences of Operations, Section 23 09 95 BAS Points List, for sensor and device requirements.
- 1.3 All products used in the installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be available for at least 10 years after completion of this contract.
- 1.4 System shall conform to the following minimum standards over network connections:
  - A. Reporting Accuracy. System shall report values with the minimum end-to-end accuracy listed in Table 1.
  - B. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

TABLE 1: Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5°C [±1°F]

Notes:

- (1) Accuracy applies to 10 percent - 100 percent of scale.
- (2) For both absolute and differential pressure.
- (3) Not including utility supplied meters.

TABLE 2: Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Space Temperature	±1.0°C [±2.0°F]	

**PART 2 - PRODUCTS**

- 2.1 Sensors And Transmitters
  - A. Any temperature or humidity sensing device mounted on an exterior wall shall be fitted with an insulated sub-base.
  - B. Binary Temperature Devices

1. Low-voltage space thermostats shall be 24 V, bimetal-operated type, concealed setpoint adjustment, 55 degrees F to 85 degrees F setpoint range, 2 degrees F maximum differential, and vented ABS plastic cover. Provide subbase with manual or automatic switching as required to perform the specified functions. Thermostats shall be single or multi-stage or modulating output as required to perform the functions specified.
2. Line-voltage space thermostats shall be bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, UL listed for electrical rating, concealed setpoint adjustment, 55 degrees F to 85 degrees F setpoint range, 2 degrees F maximum differential, and vented ABS plastic cover. Provide subbase with manual or automatic switching as required to perform the specified functions. Thermostats shall be single or multi-stage or modulating output as required to perform the functions specified.

C. Relays

1. Control relays shall be UL Listed plug-in type with dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time delay relays shall be UL Listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable  $\pm 200$  percent (minimum) from setpoint shown on plans. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA enclosure suitable for location when not installed in local control panel.

D. Voltage Transmitters

1. AC voltage transmitters shall be self-powered single loop (two-wire) type, 4 to 20 mA output with zero and span adjustment.
2. Ranges shall include 100 to 130 VAC, 200 to 250 VAC, 250 to 330 VAC, and 400 to 600 VAC full-scale, adjustable, with  $\pm 1$  percent full-scale accuracy with 500 ohm maximum burden.
3. Transmitters shall be UL/CSA recognized at 600 VAC rating and meet or exceed ANSI/ISA S50.1 requirements.

E. Control Transformers

1. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish overcurrent protection in both primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

F. DC Power Supply

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in overvoltage and overcurrent protection and shall be able to withstand a 150% current overload for at least three seconds without trip-out or failure.
  - a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MIL-STD 810C for shock and vibration. Line voltage AC input Class 1 (120 VAC or greater) units shall have UL recognition and/or CSA listing.

G. Surge and Transient Protection

1. Provide each digital controller with surge and transient power protection. Surge and transient protection shall consist of the following devices, installed externally to the controllers.
2. Power Line Surge Protection
  - a. Provide surge suppressors on the incoming power at each controller or grouped terminal controllers. Surge suppressors shall be rated in accordance with UL 1449, have a fault indicating light, and conform to the following:
    - 1) The device shall be a transient voltage surge suppressor, hard-wire type individual equipment protector for 120 VAC/1 phase/2 wire plus ground.
    - 2) The device shall react within 5 nanoseconds and automatically reset.
    - 3) The voltage protection threshold, line to neutral, shall be no more than 211 volts.
    - 4) The device shall have an independent secondary stage equal to or greater than the primary stage joule rating.
    - 5) The primary suppression system components shall be pure silicon avalanche diodes.
    - 6) The secondary suppression system components shall be silicon avalanche diodes or metal oxide varistors.
    - 7) The device shall have an indication light to indicate the protection components are functioning.
    - 8) All system functions of the transient suppression system shall be individually fused and not short circuit the AC power line at any time.
    - 9) The device shall have an EMI/RFI noise filter with a minimum attenuation of 13 dB at 10 kHz to 300 MHz.
    - 10) The device shall comply with IEEE C62.41, Class "B" requirements and be tested according to IEEE C62.45.
    - 11) The device shall be capable of operating between -20 degrees F and +122 degrees F.
3. Telephone and Communication Line Surge Protection
  - a. Provide surge and transient protection for DDC controllers and BAS network related devices connected to phone and network communication lines, in accordance with the following:
    - 1) The device shall provide continuous, non-interrupting protection, and shall automatically reset after safely eliminating transient surges.
    - 2) The protection shall react within 5 nanoseconds using only solid-state silicon avalanche technology.
    - 3) The device shall be installed at the distance recommended by its manufacturer.
4. Controller Input/Output Protection
  - a. Provide controller inputs and outputs with surge protection via optical isolation, metal oxide varistors (MOV), or silicon avalanche devices. Fuses are not permitted for surge protection.

#### H. Local control panels

1. All indoor control cabinets shall be fully enclosed NEMA construction, suitable to the installed location, with [hinged door], key-lock latch, removable sub-panels. A single key shall be common to all field panels and sub-panels. Panels shall be unitized design for transducers, relays, gauges, etc.
2. Interconnections between internal and face-mounted devices pre-wired with color coded stranded conductors neatly installed in plastic troughs and/or tie wrapped. Terminals for field connections shall be UL Listed for 600 volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

3. Provide ON/OFF power switch with overcurrent protection for control power source to each local panel.
4. Provide 120V receptacle at each local panel location.

### **PART 3 - EXECUTION**

#### 3.1 Examination

- A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started.
- B. Inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started.
- C. Examine the project drawings and specifications. If head room or space conditions appear inadequate, or if any discrepancies occur between the plans and the temperature controls work and the plans and the work of others, then report these discrepancies to the Engineer and obtain written instructions for any changes necessary to accommodate the temperature controls work with the work of others. Any changes in the work made necessary by the failure or neglect to report such discrepancies shall be made by and costs borne by this Contractor.

#### 3.2 Installation Of Sensors

- A. Install all sensors in accordance with the manufacturer's recommendations.
- B. Mount sensors rigidly and adequately for the environment within which the sensor operates.
- C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing.

#### 3.3 Local Control Panels

- A. Local control panels shall be provided for the equipment being controlled. Panel shall be mounted in mechanical, electrical rooms or electrical closets. Mount panels on wall, columns or independent supports near each respective unit. Do not mount on the unit proper unless the unit has internal jam isolation and the control panel and unit have been designed for direct mounting.

#### 3.4 Identification Of Hardware And Wiring

- A. All wiring and cabling, including that within factory fabricated panels, shall be labeled at each end within 2 inches of termination with the DDC address or termination number.
- B. Permanently label or code each point/object of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum 0.50 inch letters on laminated plastic nameplates.
- D. Identify all other control components with permanent labels. All plug-in components shall be labeled such that removal of the component does not remove the label.
- E. Identify room sensors relating to terminal box or valves with nameplates.

- F. Manufacturers' nameplates.
- G. Identifiers shall match record documents.
- H. Upon completion of the project, furnish a complete set of these drawings and diagrams, framed under clear plastic, and hang on the wall of the Mechanical Equipment Room where directed.

END OF SECTION





## **23 09 47 CONTROL POWER AND WIRING FOR HVAC**

### **PART 1 - GENERAL**

- 1.1 Controls shall be an extension of the existing Siemens control system.
- 1.2 Provide all electrical wiring, both line voltage and low voltage, which is required to perform the automatic control functions.
- 1.3 Where power sources are required beyond sources explicitly shown on the Division 26 drawings, these shall be provided under the Division 23 Contract. Where auxiliary contacts are required on starters to perform the required functions these, too, shall be provided under the Division 23 Contract. Where not provided under Division 26, auxiliary external relays may be provided in lieu of auxiliary contacts.
- 1.4 Wiring, both line and low voltage, shall comply with The National Electric Code (NEC) and shall be subject to approval of the local code enforcing authorities.
- 1.5 Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- 1.6 Install all equipment in readily accessible locations as defined by the National Electrical Code (NEC).
- 1.7 Do not install Class 2 wiring in conduit containing Class 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).
- 1.8 All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings.
- 1.9 Provide tagging or labeling of conduit so that it is always readily observable which conduit was installed or used in implementation of this Work.
- 1.10 All wiring and cabling, including that within factory fabricated panels, shall be labeled at each end within 5 cm [2 inches] of termination with the DDC address or termination number.
- 1.11 Communication conduits shall not be installed closer than six feet from high power transformers or run parallel within six feet of electrical high power cables. Care shall be taken to route the cable as far from interference generating devices as possible. Where communication wire must cross high power wire (deemed as 110VAC or greater) it must do so at right angles.
- 1.12 All shields shall be grounded (earth ground) at one point only to eliminate ground loops. All shield grounding shall be done at the controller location with the shield at the sensor/device end of the applicable wire being left long and "safed" off in an appropriate manner.
- 1.13 There shall be no power wiring, in excess of 30 VAC rms, run in conduit with communications wiring. In cases where signal wiring is run in conduit with communication wiring, all communication wiring and signal wiring shall be run using separate twisted pairs (24awg) in accordance with the manufacturer's wiring practices.

### **PART 2 - PRODUCTS**

- 2.1 Wire, conduit and installation methods shall conform to applicable provisions of Division 26 - Electrical except that wiring smaller than No. 12 and conduit smaller than 0.75 inch are permitted as appropriate for the application.
- 2.2 Communication wire shall meet the following requirements as a minimum. Control system manufacturers recommendations which exceed these requirements shall govern.
  - A. Category 6 plenum rated, 4 twisted pair, non-shielded (UTP) station cable (capable of transmission speeds up to 100 Mb/s) shall be used for control system networking. Cable shall be insulated with FEP material and sequentially marked at 2 foot intervals. Color as selected by Owner.

Gauge	24 AWG
Nominal O.D.	.17 in.
Min. Bend Radius	.5 in.
Standards/Certification	UL 444, UL 13 EIA/TIA 568, Cat. 5 PN-2841
DC Resistance	9.38 ohm/100 m
Maximum mutual capacitance of a pair @ 1 KHz	5.6 nF/100 m
Unbalanced Capacitance per pair to ground @ 1 KHz	330 pF/100 m
Impedance	100 ohm ± 15%
Structured Return Loss 10/100 Mhz	23/16 dB/100 m
Attenuation (max at 100 m)	4.1 dB @ 4 Mhz 8.2 dB @ 16 Mhz 22.0 dB @ 100 Mhz
NEXT (min. at 100 m)	53.0 dB @ 4 Mhz 44.0 dB @ 16 Mhz 32.0 dB @ 100 Mhz
Propagation Delay (min. @ 10 Mhz)	5.7 ns/m

- 2.3 Wiring and raceways
  - A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of Division 26.
  - B. All insulated wire to be copper conductors, UL labeled for 90 degrees C minimum service.
  - C. Conduit for Control Wiring, Control Cable and Transmission Cable: Electrical metallic tubing (EMT) with compression fittings, cold rolled steel, zinc coated or zinc-coated rigid steel with threaded connections.
  - D. Outlet Boxes (Dry Location): Sheradized or galvanized drawn steel suited to each application, in general, four inches square or octagon with suitable raised cover.
  - E. Outlet Boxes (Exposed to Weather): Threaded hub cast aluminum or iron boxes with gasket device plate.
  - F. Pull and Junction Boxes: Size according to number, size, and position of entering raceway as required by National Electrical Codes. Enclosure type shall be suited to location.

- G. Sensor and/or signal cabling for controller I/O shall be multi-conductor type, stranded copper conductors, shielded, with plenum rated outer jacket. Conductor size shall be as recommended by the manufacturer for cable length and device power consumption.
- 2.4 Provide an Uninterruptible Power Supply system battery backup for each controller and its respective input/output devices. Circuits for VAV DDC controllers and other unitary type controls need not be on backup power. Uninterruptible Power Supply shall protect against blackouts, brownouts, surges and noise.
- A. Uninterruptible Power Supply shall include LAN port and modem line surge protection.
  - B. Uninterruptible Power Supply shall be sized for a 7-minute full load runtime, 23-minute ½ load runtime, with a typical runtime of up to 60 minutes. Transfer time shall be 2 – 4 milliseconds or less.
  - C. Uninterruptible Power Supply shall provide a 480-joule suppression rating and current suppression protection for 36,000 amps and provide 90 percent recharge capability in 2 – 4 hours. Suppression response time shall be instantaneous. Uninterruptible Power Supply low voltage switching shall occur when supply voltage is less than 94 volts.
  - D. Provide a maintenance bypass switch that allows input voltage to bypass the Uninterruptible Power Supply and directly power the connected equipment if an abnormal condition prevents the Uninterruptible Power Supply from supporting the load, or if the Uninterruptible Power Supply is required to be taken out of service. Provide all software, cables, peripherals, etc. for a complete system.

### **PART 3 - EXECUTION**

- 3.1 All line voltage wiring and low voltage wiring in the following locations and applications shall be run in conduit regardless of local building code allowances:
- A. Mechanical Rooms, Electrical Rooms and other similar equipment rooms.
  - B. Vertical risers (except if contained within a 2-hr or greater rated shaft).
  - C. Open Areas where wiring will be exposed to view or tampering.
  - D. Outdoors.
  - E. Exhaust Method Smoke Control Systems (all wiring run in conduit, regardless of location or path).

Other than the specific locations and applications above, low voltage wiring concealed above accessible ceilings may be run without conduit. Open wiring dropping into walls shall be run in conduit. Thermostats shall be installed on a single gang box and conduit shall be installed to extend into the plenum. Open wiring shall be bundled and supported at 3 ft. maximum intervals with a system of J-hooks. Open wiring in air plenums shall be rated for such use and so labeled.

- 3.2 Thermostats and other wall mounted sensors shall be installed on a single gang box. EMT conduit shall be installed from the wall box to the plenum; cabling within the wall shall be in conduit.
- 3.3 Provide electrical circuits from the nearest appropriate “Legally Required” or “Owner Optional” emergency electrical panel to serve control panels, transformers, and other control equipment and devices. Circuits serving control panels and transformers for low voltage service shall be

independent and used for no other purpose. Circuits for VAV DDC controllers and other unitary type controls need not be on "Legally Required" nor "Owner Optional" emergency power. Provide circuit wiring from the electrical panel. These circuits shall be clearly identified at the panels. Coordinate with Division 26.

END OF SECTION

## 23 09 93 SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

### PART 1 - GENERAL

- 1.1 Implemented Sequences of Operation shall be in compliance with ASHRAE 90.1-2019, unless deviated by the sequences with-in. Any additional deviations must be reviewed with the Engineer prior to implementation.
- 1.2 Provide all equipment (dampers, actuators, controllers, etc.) required to perform the functions specified unless noted herein or elsewhere in these contract documents. Electric motor driven equipment (pumps, chillers, compressors, cooling towers, etc.) shall be provided with minimum on (run) and minimum off timers to prevent short cycling of the equipment (coordinate with equipment manufacturer's).
- 1.3 All DDC system control points shall have a default value in case of sensor failure or logic error. All controlled devices shall fail safe on loss of control. All setpoints and parameters shall be fully adjustable from the end user / owner interface.

### PART 2 - PRODUCTS

- 2.1 Refer to Section 23 09 23 and 23 09 25 for applicable products.

### PART 3 - EXECUTION

- 3.1 "Occupied", "Unoccupied" and Override Modes
  - A. Each air-side system shall be scheduled (independently) for "Occupied" and "Unoccupied" modes of operation, unless stated otherwise in the specific system sequences of operations with-in.
  - B. Automatic controls shall be capable of retaining programming and time settings during loss of power for a period of at least ten hours, and shall include an accessible override that allows temporary operation of each system for up to two hours.
  - C. The "Occupied" mode of operation shall be scheduled through a time and date calendar function at the DDC system operator workstation. The initial "Occupied" mode schedule shall be in effect Monday through Friday, 7:00 a.m. to 5:00 p.m. unless noted otherwise in the specific system sequences with-in. Coordinate time of day scheduling with Owner. Scheduling software shall be capable of seven different day-types per week.
  - D. The "Unoccupied" mode shall be in effect whenever the zone or system is not in "Occupied" mode. Activation of the building security system shall also override the zone or system to the "Unoccupied" mode.
  - E. "Override" mode shall put the zone or system into "Occupied" mode when any of the following occurs:
    1. "Occupied" mode initiated through manual override of the "Unoccupied" mode at the operator workstation.
    2. "Occupied" mode initiated by a zone override device. A zone override device shall be a occupancy sensor as defined with-in or on the drawings.

Whenever the zone or system occupancy sensor detects movement and heat changes, the "Occupied" mode shall be enabled. If movement and heat changes are not detected for 20 minutes (adjustable), the zone or system "Occupied" mode shall be disabled.

Whenever the zone vacancy sensor detects movement and heat changes, and the zone light switch is turned on, the "Occupied" mode shall be enabled. If movement and heat changes are not detected for 30 minutes (adjustable), or the zone light switch is turned off, the zone "Occupied" mode shall be disabled.

### 3.2 Zone Heating and Cooling Setpoints

- A. Zone heating and cooling setpoints shall be as follows except as specified otherwise. All setpoints shall be adjustable.

"Occupied" Zone Cooling Setpoint: 75 deg F.

"Occupied" Zone Heating Setpoint: 5 deg F below "Occupied" Zone Cooling Setpoint

"Unoccupied" Zone Cooling Setpoint: 7 deg F above "Occupied" Zone Cooling Setpoint but no warmer than 82 deg F

"Unoccupied" Zone Heating Setpoint: 10 deg F below "Occupied" Zone Heating Setpoint but no lower than 60 deg F. For radiant systems, the "Unoccupied" Zone Heating Setpoint shall be 4 degrees below the "Occupied" Zone Heating Setpoint.

- B. Dual Duct VAV Control – Box controls shall modulate the hot and cold supply air dampers to provide the following sequence: when room temperature exceeds cooling setpoint, cooling control damper shall modulate open, up to maximum CFM scheduled. When room temperature drops below cooling setpoint cooling supply air control damper shall modulate towards closed position, and heating supply air control damper shall begin to modulate open, resulting in a blended supply air equal to minimum CFM scheduled. A further drop in room temperature below heating setpoint shall cause cooling supply control damper to continue fully and heating supply control damper to continue modulating open. Supply air CFM in this heating mode shall be equal to minimum CFM schedule.
- C. Energy Management - Each VAV box shall have its own time of day schedule for "Occupied" and "Unoccupied" control. An override pushbutton shall be provided at each sensor thermostat to override the "Unoccupied" schedule for a fixed (programmable) time. The DDC system shall track, log and report on the amount of time each box was overridden as well as VAV box discharge air temperature.

### 3.3 General Exhaust Fans

Each exhaust fan (and its respective automatic damper) where indicated on the Electric Drawing Starter Schedule shall be a separate start/stop point of the digital control system.

Control of Exhaust Fans:

EF-9                    On when building is occupied. Coordinate schedule with owner.

### 3.4 Smoke Dampers (including Combination Fire/Smoke Dampers) and Smoke Detection Interlocks

Duct mounted smoke dampers with 120 volt operators are being provided under Division 23. Associated duct mounted smoke detectors are being provided under Division 26 / 28. Provide power to and control of the smoke dampers. 120 volt power will be provided by Division 26 to a J-box near each group of smoke dampers. Extend this power wiring to the smoke damper operators thru a control relay for automatic control by the BAS. Refer to electrical drawings for J-box locations and HVAC drawings for typical wiring schematic.

For each air handling unit, a single control module shall be provided per Division 26 / 28, one for each AH unit, that will be activated when any duct mounted smoke detector associated with that AH unit is in alarm, whether it's from the return air unit detector or from a duct detector associated with a smoke damper. Once an AH unit is in smoke alarm, that unit shall shut down (refer to AH unit safeties) and all associated smoke dampers shall be closed, all by the BAS. Also, when an air handling unit is "off" for any reason, its associated smoke dampers shall close. Provide an adjustable time delay (initially set at 30 seconds) between stopping the AH unit and closing its associated smoke dampers, to prevent damaging ductwork. Note that the fire alarm control module for interface with the BAS must be located within 36 inches of the BAS controller controlling the smoke dampers.

Also, provide a current sensor on each power circuit (downstream of the control relay(s)) serving smoke dampers and wire thru the safeties' circuit of the associated air handling unit and return fan starter so that the unit cannot restart unless there is proven power to their associated smoke dampers (assuming that the smoke dampers will be open when power is present and thus safe for the fans to start back up).

All components shall be UL 864 compliant.

### 3.5 Monitoring and Alarms

The following points shall be monitored and alarmed at the monitoring console and as otherwise specified hereinafter:

#### A. Point Descriptions:

1. Current Sensing Relays Provide for all air handling unit supply and return/exhaust fans; all chilled, hot, domestic hot recirculating and condenser water pumps; all general exhaust fans.
2. High/Low Temperature Alarms on all DDCS temperature sensors with off normal messages.
3. Fire Alarm System Inputs Fire alarm shall be input into the DDCS for information and smoke control mode. Provide wiring from the DDCS inputs to the Fire Alarm System outputs. Coordinate connection points with the Electrical Contractor.

B. When interfacing with equipment providing remote analog inputs or receiving analog outputs to the DDCS or when monitoring requires the installation of external relays at the equipment being monitored, coordinate all requirements such as range, signal condition, grounding, wiring and input impedance with the supplier of the equipment being monitored.

C. Dial Out Alarms – DDCS shall initiate a phone call and print an alarm message at a remote printer, digital pager, or PC operating in terminal mode whenever the system detects a critical alarm. These alarms shall include but not be limited to: AHU freezestat alarm, chiller trouble, boiler or heating failure. Coordinate alarms with owner.

END OF SECTION





**23 09 95 DIRECT DIGITAL CONTROL SYSTEM POINTS LIST**

**PART 1 - GENERAL**

1.1 The following list shall be the minimum points required of the Direct Digital Control System (DDCS). It is not the intent to show all required points. If or when additional points are required to accomplish the sequences of control specified, these points shall also be provided. The point types are identified as follows:

- DI Contact Input (NO or NC)
- DO Contact Output (NO or NC)
- AI Analog Input
- AO Analog Output
- PI Pulsed Input

1.2 Dual Duct VAV Air Terminal Unit Points List (per each unit):

Type	Description	Quantity
AI	Space Temperature	1
AI	Space Temperature Setpoint	1
AI	Discharge Air Temperature	1
AI	Air Volume (CFM)	1
DI	Occupancy Override	1
AO	Air Damper	1

1.3 Exhaust Fan Systems - Existing

Type	Description	Quantity
DO	Exhaust Fan Start/Stop	*
DI	Exhaust Fan Status	*

1.4 Smoke Dampers

DI	Smoke Alarm	**
DI	Smoke Damper End Switches	***

\*One for each fan system.

\*\*For notice of smoke detection at the B.A.S., shutdown of fan, and closure of associated smoke dampers.

\*\*\*One for each smoke damper.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION - NOT USED**

END OF SECTION



**23 31 13 HVAC DUCTWORK**

**PART 1 - GENERAL**

- 1.1 Ducts, sheet metal plenums and associated devices, accessories and work items shall be provided as shown on the drawings and as specified hereinafter.
- 1.2 Ductwork, materials, construction, reinforcing and installation shall conform to SMACNA HVAC Duct Construction Standards, latest edition, and other applicable SMACNA standards. In addition, duct systems, components and accessories shall comply with applicable provisions of NFPA 90A, 90B, 96 and 255, and UL 181, 181A, and 181B, including smoke and flame ratings.
- 1.3 Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.
- 1.4 A copy of each of the applicable current SMACNA Standards manuals shall be on the job site during the progress of the work.
- 1.5 Refer to the Duct Construction and Sealing Schedule on the drawings for information pertinent to the various duct systems, such as duct materials, SMACNA pressure class, seal and leakage class, external insulation, duct liner, etc.
- 1.6 Refer to the drawings for ductwork that is to be internally lined. Ductwork shall only be internally lined where scheduled or noted on the drawings.
- 1.7 Ductwork shall not be internally lined, unless shown otherwise for return or exhaust.
- 1.8 Refer to 23 05 05 Firestopping for requirements related to non-fire dampered ductwork penetrating fire rated walls and partitions, and to 23 07 14 Fire Barrier Wrap for ductwork requiring such products.

**PART 2 - PRODUCTS**

- 2.1 Sheet metal shall be lock forming quality galvanized steel, ASTM A924/A924M and A653/A653M, G60 coating designation, 24 gauge minimum, except as otherwise noted or specified. Other materials and construction for special applications required are as shown on the drawings and specified below.
- 2.2 Ductwork, as noted on the drawings, that will remain exposed in finished areas which will be painted shall be fabricated of sheet metal with galvanized or bonderized (phosphated) coating.
- 2.3 Flexible duct shall be installed as detailed on the drawings and shall not pass through any wall, floor, or ceiling. Flexible ducts and air connectors shall not pass through any fire-resistance-rated assembly.

- A. Flexible air (duct) connectors for galvanized steel ductwork shall be:

Constructed of galvanized steel spiral wire mechanically locked to an airtight laminated aluminum foil, fiberglass and aluminized polyester duct fabric. Duct shall be rated at a minimum of 10 inches w.c. positive pressure and 4 inches w.c. negative pressure. Unless otherwise detailed on the drawings, length shall be limited to 4 feet for Air Terminal Units and 5 feet for Air Devices .

Insulated flexible duct shall have 1 inch thick R-4.2 fibrous glass insulation and .10 perm polyethylene vapor barrier outer jacket, equal to Flexmaster Type 5B or .05 perm reinforced metalized vapor barrier outer jacket, equal to Flexmaster 5M. Insulated duct assembly shall conform to be UL 181 and listed as Class I Flexible Air Connector.

Non-insulated flexible duct shall be equal to Flexmaster NI-55, shall conform to UL181 and be listed as Class I Flexible Air Connector.

- 2.4 Interior duct liner for acoustical and thermal insulating purposes shall conform to ASTM C1071 and shall be GreenGuard Certified for low formaldehyde and low VOC emissions. Liner shall be 1 inch thick R-4.2 flexible fiberglass bonded with thermosetting resin. The interior (airside) surface shall be covered with a durable mat facing, which shall encapsulate the liner materials, provide a smooth face to the airstream and protect the liner from cuts and abrasions. The facing shall be treated with an EPA registered anti-microbial agent to reduce the potential for microbial growth. Edges of the liner shall be covered with an encapsulating coating to seal transverse liner edges and prevent surface flaring due to airstream. Noise Reduction Coefficient (NRC) for the liner shall be 0.70 or better. Liner shall not exceed 25/50 for flame spread/smoke developed per ASTM E84. Liner shall be rated for air velocities up to 5000 feet per minute and operating temperatures up to 250 degrees F. Note that duct sizes indicated on the drawings are inside clear dimensions, and that sheet metal dimensions are 2 inches greater in each dimension for rectangular ductwork, and 2 inches greater diameter for round ductwork. Liner shall be CertainTeed "Toughgard R", or equal by Owens Corning, Johns Manville or Knauf.

## 2.5 Rectangular Ductwork

- B. Elbows shall have an inside radius equal to the duct width. Where 90 degrees elbows are shown to be square on the drawings, they shall be square (mitered) with turning vanes, single vane type in lengths 32 inches and less, double wall in longer vanes, installed and supported per SMACNA. Elbows less than 90 degrees shall be radiused. Non-radiused elbows less than 90 degrees, with or without turning vanes, are not permitted.
- C. Square Tee fittings shall include turning vanes. The widths of the two branch ducts shall add up to the width of the main duct, and the duct depths shall remain constant. Turning vanes shall be single vane type in lengths 32 inches and less, double wall in longer vanes, installed and supported per SMACNA.
- D. Offsets and transitions shall conform to SMACNA. Unless shown otherwise on plans, transition angles shall be limited to 60 degrees on converging transitions as measured on the interior, and 30 degrees on diverging transitions as measured on the interior.
- E. Branch take-offs, where not detailed otherwise, shall be with a static boot (45 degrees clinch collar) per SMACNA. Straight tap take-offs are not permitted.
- F. Divided flow branches shall conform to SMACNA. Bull head tees without vanes are not permitted.
- G. Manufactured duct connectors similar to Ductmate Industries "25", "35" and "45" may be used on rectangular ductwork except where welding or brazing is specifically required. Adhere strictly to manufacturer's instructions. SMACNA duct gauge thickness and reinforcing shall be maintained when using this joining method, or the manufacturer's requirements, whichever is more stringent. Connector components shall be constructed from same material as the duct section being connected.

## 2.6 Fan Transitions

- A. Fan inlet – Maximum 15 degrees diverging as measured on the interior, and 30 degrees converging as measured on the interior, and first duct elbow shall be minimum 2.5 fan inlet diameters away unless shown otherwise on plans.
- B. Fan Discharge -- Maximum 15 degrees diverging as measured on the interior, and 30 degrees converging as measured on the interior, and first duct elbow shall be minimum 2.5 fan inlet diameters away unless shown otherwise on plans

## 2.7 Round and Flat Oval Ductwork:

- A. Round and flat oval duct shall be factory or shop formed spiral lock seam, United McGill Air Products "Uni Seal" or equal by Langdon, Semco, Tangent Air, Precision Duct.
- B. In lieu of the above, round duct, fittings and connectors may be Linx Industries' Lindab "Safe" (single wall) or "ISOL" (double wall) duct systems with fitting ends factory equipped with double lipped "U" profile EPDM gasket. Spiral ducts shall conform to Lindab standards and shall be calibrated to published dimensional tolerances of Lindab. Insulation R-values and liner types shall be as specified above.
- C. Elbows and fittings for spiral lock seam round and flat oval ductwork shall be factory solid welded, equal to United McGill Air Products "Uni Seal" and "Acousti-k27" with beaded sleeve transverse joint connectors, or equal by Langdon, Semco, Tangent Air, Precision. For duct systems classified at less than 3" w.c., elbows and fittings may be roll pressed type. Elbows shall be long radius type and, where shown, square type ells shall be mitered with turning vanes. Branch take offs shall utilize a 45 degree entry low loss tap or a conical lateral tap to minimize pressure loss, except that streamlined conical taps may be used where space constraints dictate. Tee fittings shall include elongated proportional turning vanes to equalize airflow around the ells. Wye branches shall be used at end of runs unless shown otherwise. Offsets and transitions shall conform to SMACNA. Transition angles shall be limited to 60 degrees on converging transitions as measured on the interior, and 30 degrees on diverging transitions as measured on the interior. Divided flow branches shall conform to SMACNA. Bull head tees without vanes are not permitted.
- D. Construction, reinforcing, supports, etc. shall either conform to SMACNA or to the duct manufacturer's standards, whichever is more stringent.
- E. Round duct of 1 inch and less (positive and negative) static pressure construction class may be longitudinal seam. Elbows for longitudinal seam round ductwork shall be factory or shop formed segmented standing seam or pleated. Other fittings shall be comparable to the elbows.

- ## 2.8 Air device duct connections for round duct branch connections to rectangular sheet metal ducts shall be 24 gauge sheet metal, equal to Flexmaster Series FL, straight side, minimum 24 gauge with and without manual damper, as described on the drawings. When manual damper is provided it shall be minimum 22 gauge with stamped re-enforcements and include .375" square shaft and locking quadrant equal to Ventlok 639 or Rossi "Everlock", with 2" standoff and nylon bushings. Air terminal unit duct connections for round duct branch connections to rectangular sheet metal ducts shall be 24 gauge sheet metal conical type equal to Flexmaster Series CB. Connectors installed on interior lined rectangular duct shall have an integral insulation guard sleeve. Rectangular tap-to-round branch connection with static boot configuration shall be equal to Flexmaster Type STO. Buckley "Air Tite" fittings or similar by "Snap Rite", equal to the specified Flexmaster fittings, with

neoprene gasket and adhesive facing, additionally secured with minimum four sheetmetal screws, may be used for air device duct taps to rectangular sheet metal duct which is not internally lined.

- 2.9 Duct sealants containing asbestos are prohibited. All duct sealants, tapes and connectors shall be listed and labeled in accordance with UL 181A, 181B or 181C as applicable to the application. Duct sealant materials shall be one or more of the following (compatible with the application):
- A. LEED Compliant solvent based sealers and mastics equal to Design Polymerics, with a maximum VOC content of 50 grams/liter.
  - B. Water base duct sealers and mastics equal to United McGill or Foster Products when the installation environment is above 40 degrees F.
  - C. Acetone based duct sealers and mastics, equal to Precision Adhesives, when the installation environment is between 0 degrees F and 40 degrees F, zero reportable V.O.C.'s.
  - D. Mineral impregnated fiber tape with liquid sealant duct joint sealer equal to that manufactured by Hardcast, Inc., Two Part II Sealing System, maximum V.O.C. of 135 g/l.
- 2.10 Ductwork that crosses building seismic joints or expansion joints shall be fitted with flexible connectors that will accommodate the building movement in all directions. Connectors shall be manufactured by Mercer Rubber or approved equal, multiple plies and arches of elastomer-impregnated fabric or cord, EPDM construction with mounting flanges, all rated for 250 degrees F service at pressure rating consistent with the associated duct system. Refer to duct construction schedule. Grease ductwork shall not be fitted with flexible connectors.

### **PART 3 - EXECUTION**

- 3.1 Duct thickness, construction, reinforcing, support and installation including cabling systems, shall conform to SMACNA HVAC Duct Construction Standards, latest edition and other applicable SMACNA standards. Cable support systems are not allowed. Duct reinforcing shall be external to the duct except that rectangular ducts of 3 inches s.p. class or greater with a dimension exceeding 48 inches may utilize internal tie-rod supports in accordance with SMACNA. Only round tubing, rods or conduit is permitted as tie-rods, utilizing the minimum diameters required by SMACNA.
- 3.2 Transverse joints and longitudinal seams shall be assembled with sealant to conform to SMACNA sealing requirements as indicated in the Duct Construction Schedule on the drawings. Selection of sealant materials shall be compatible with the application. Sealants shall be applied in accordance with manufacturer's recommendations, including application temperature ranges.
- 3.3 Attachment of hangers and straps to the structure shall be with:
- A. After-set concrete inserts, in 4 inches minimum depth concrete, set in drilled holes. Powder actuated driven fasteners are not permitted.
  - B. Unistrut type channel support system may be utilized. Channel shall be pre-set or attached to the structure with inserts or clamps.
  - C. Attachment to steel deck is prohibited. Span from steel structural members with supplementary steel shapes where direct attachment to structural members is not practical. This does not apply to steel deck with concrete slab poured on the deck. Refer to A. and B. above.

- D. Attachment to manufactured trusses, joists, purlins, and other engineered structural members and supports shall be done in strict accordance with the structural engineer's or manufacturer's recommendations. Refer to the architectural and structural drawings for type of engineered structural systems being used. Connections to these structural members shall be made with connection devices and methods approved by the structural engineer or manufacturer. Provide additional supports with supplemental steel shapes when spacing between structural members exceeds specified distances. In the case of existing trusses, the structural engineer must review and approve hanger attachment methods.
- 3.4 Ductwork with galvanized or bonderized coating shall be wiped clean to remove dirt, dust, oil and other contaminants in the shop before delivery to the jobsite. Care shall be taken in storage and installation to maintain cleanliness of the surfaces. Prior to painting, again wipe the surfaces clean.
- 3.5 Flexible air (duct) connectors shall be attached to metal duct with Panduit nylon banding straps or stainless steel clamps. Nylon banding straps shall be tightened utilizing a cable tie gun. Outer jacket of insulated flexible duct shall be closed at the ends with sealant and nylon banding straps or U.L. listed aluminum foil duct tape equal to Nashua No. 617022 with UL 181 listing printed on the face. Maximum length shall be 7 ft. with support at 4 ft. maximum spacing. Duct shall be free of sags and sharp bends. Utilize flexible duct elbow supports at all elbows. Flexible supports shall be UL listed for ceiling return air plenum use per UL 2043, UL 723 or ASTM E84, as manufactured by Titus (Flexright) or Thermaflex (Flex Flow) or approved equal. Independently supported radius'd sheet metal elbows may be used in lieu of flexible duct elbow supports when installed directly on air devices.
- 3.6 Flexible air (duct) connectors shall not be installed:
- A. Where ductwork is exposed.
  - B. Thru any wall, ceiling, floor or fire rated or smoke rated assembly.
  - C. In the immediate vicinity of, and connecting to, air devices in fire rated ceilings where the assembly details require steel ductwork.
- 3.7 Interior duct liner shall be installed at time of ductwork fabrication. Liner shall be installed in strict accordance with the manufacturer's instructions and SMACNA standards. Liner shall provide full coverage of the ductwork, with all edges neatly butted together without gaps or interruptions. Adhesive shall cover at least 90 percent of the sheet metal surface. In addition, mechanical fasteners shall be utilized where required by SMACNA standards, NAIMA standards, or the liner manufacturer. Fasteners shall not compress the liner more than 10 percent of the liner thickness. Raw exposed liner edges resulting from shop cutting of the liner shall be treated with a sealant to protect the fibrous liner material from moisture or erosion due to air movement. Provide metal nosing at the leading edge of transverse joints at fan discharge and any joint preceded by an unlined section of ductwork. In addition, metal nosing is required at every transverse joint when the air velocity exceeds 3000 feet per minute. Repair any damage to liner coating with repair sealant/coating approved by the liner manufacturer. Protect liner and lined ductwork from dirt and moisture during fabrication, transport and storage, as well as during and following installation of the ductwork.
- 3.8 Duct access doors shall be provided for access to equipment, damper operators, devices and instruments inside the duct, at each fire damper, smoke damper and duct smoke detector (refer to Electrical drawings) and where otherwise shown. A wall or ceiling access panel shall be provided where duct access is required thru a wall or inaccessible ceiling. Refer to 23 05 04 Basic HVAC Materials and Methods for such access panels.

- 3.9 Access door and fire damper shall be so arranged and located such that the spring catch and fusible link are accessible when the damper is closed. The door shall be sized to permit entry of arms or body in resetting of the damper. Special consideration must be given for larger dampers and spring loaded horizontal dampers.
- 3.10 Coordinate openings required for the passage of ductwork thru walls, partitions, floors and roofs with the General Contractor. Sleeves are not required except as stated below.
- 3.11 Sheet metal sleeves in conjunction with fire dampers shall be placed in walls and floors to pass ductwork.
- 3.12 Where a fire damper is not required in a duct penetrating a fire rated wall or partition, the opening shall be fitted with a sleeve conforming to the requirements of the firestopping assembly. Refer to 23 05 05 Firestopping.
- 3.13 Annular spaces around ducts or duct insulation passing thru non-fired rated walls and partitions shall be closed with caulking or other compatible material to retard the passage of smoke. Annular spaces around ducts not fitted with fire dampers that pass thru non-fire rated floors shall be similarly closed.
- 3.14 Stored ductwork shall be blocked up off the ground and completely covered with visqueen. Open ends of both stored and erected duct shall be capped or covered with visqueen secured with duct tape before the end of each day's work to preclude contamination or entry of foreign materials. Factory made covers with elastic banding as manufactured by Duct Cap are also an acceptable means for temporary duct closure.
- 3.15 Where duct surfaces can be seen thru grilles, registers and diffusers, the inside of the duct shall be coated with flat black paint before the device is installed, to eliminate obtrusive appearances.
- 3.16 Ductwork and piping shall not be run above electrical switchgear or panelboards, nor above the access space in the immediate vicinity of the equipment in accordance with The National Electric Code.
- 3.17 Coordinate duct layout carefully with other trades to avoid conflict with structural elements, lighting and plumbing heating piping. Flattening of ductwork and offsets to fit ductwork in available space is generally shown. In the absence of such, arrange the ductwork to maintain concealment and allow ceilings and lights to be installed as intended. Do not hang ductwork until possible interference with electrical and mechanical trades have been resolved. Having ductwork fabricated and delivered in advance shall not be justification for interference with other trades.

END OF SECTION



**23 33 00 AIR DUCT ACCESSORIES**

**PART 1 - GENERAL**

- 1.1 Ductwork accessories specified herein shall include manual balancing dampers and fire dampers. Refer to the drawings for scope and application.
- 1.2 Balancing dampers are also specified to be furnished with "spin-in" duct taps specified in Section 23 31 13 HVAC Ductwork and in Section 23 37 00 Air Outlets and Inlets. Automatically controlled dampers are specified in the temperature controls sections and also specified as integral components of air handling equipment, fans, VAV control units and other such equipment.
- 1.3 Manual balancing dampers, in addition to those shown, which will be required to effect a positive balancing of air in the system shall be provided in the ductwork. The company or agent who is to balance the air systems shall call the HVAC Contractor's attention to requirements for additional balancing dampers which are deemed necessary.
- 1.4 Fire dampers and smoke dampers shall be provided where shown on the drawings and where otherwise required to conform to the NFPA 90A and Building Code requirements.

**PART 2 - PRODUCTS**

- 2.1 Dampers and accessory items shall be constructed of galvanized steel, except those in ducts of stainless steel, aluminum, PVC coated or other such materials shall be stainless steel to maintain the intended corrosion resistance of the system.
- 2.2 Balancing dampers shall be single cross-blade up to 12 inches blade width and in larger sizes, multiple blade type 6 inches maximum width with opposed blade arrangement. Dampers shall have a full length continuous drive shaft and be controlled by a locking quadrant positioner with handle and minimum .375" square shaft, equal to Rossi "Everlock" or Ventlok #641 and for externally insulated ducts Rossi "Everlock" with 2" stand-off or Ventlok #644. For ductwork classified as 2" and greater, provide HiVel Ventlok Acorn Nut, End Bearing and gasket hardware.
- 2.3 Fire dampers shall be as follows:
  - A. Dampers shall be constructed and tested to conform with UL 555, shall be UL labeled and shall be rated for use in static or dynamic systems, as indicated on the drawings, or as required by the Mechanical Code All fire dampers installed in corridor walls shall be dynamic rated, even when indicated as static on drawings, and shall demonstrate acceptable closure performance when subjected to minimum 150 feet per minute velocity across the face of the damper in conformance with the UL 555 fire exposure test.
  - B. Review the architectural drawings to determine wall ratings and select dampers accordingly.
  - C. Dampers shall be as manufactured by Ruskin, Greenheck, Nailor or Carnes, equipped with a 165 degree (unless otherwise noted) fusible link. Pressure level construction shall conform to that of the duct as indicated in the Duct Construction Schedule on the drawings.
  - D. The following is a description of fire damper types:
    1. TYPE "B"  
Low velocity (below 2000 fpm) with folded blade curtains stored out of air stream.

- 2.4 Smoke dampers shall be as manufactured by Ruskin, Greenheck, Nailor or Carnes, constructed and tested to conform to UL 555S, shall be UL labeled and rated for use in dynamic systems. Dampers shall have center pivoted multiple blades complete with blade and jamb seals and factory furnished and installed two-position actuator and linkage with end switch (for positive proof open). Tied to the B.A.S., and remote test station. Remote test station shall include L.E.D. indicator lights for damper status (open/closed) and keyed switch to cycle damper to normal/closed damper positions. The actuator shall be a 120-volt AC electric operator, externally mounted unless noted otherwise, arranged for powered opening and spring return closing of the damper. Junction boxes shall be sized per NEC to accept all power and control wiring. Dampers shall have airfoil blades and AMCA certified for Leakage Class I (4 cfm/sq. ft. at 1 inch S.P.). Pressure level construction shall conform to that of the duct as indicated in the Duct Construction Schedule on the drawings. Blades shall either be horizontal or vertical as the application dictates, and in conformance with its UL listing. Static pressure loss at 1000 fpm for a 24 inches x 24 inches damper shall be maximum .03 inch w.c.. Dampers that are installed in "out of wall" or "out of floor" conditions shall be designed, listed and labeled for such applications. The contractor shall provide "out of wall" and "out of floor" dampers as indicated on the drawings and as required for adequate access.

### **PART 3 - EXECUTION**

- 3.1 Fire dampers shall be installed in conformance with manufacturer's instructions and SMACNA recommendations. Dampers shall be installed in sheet metal wall or floor sleeves along with retaining angles and duct access doors or panels. Sleeve and duct connections shall be breakaway type or rigid type with corresponding gauge requirements in accordance with the manufacturer's instructions and SMACNA recommendations. Provide a duct access door for each damper, minimum 12"x12" or removable duct section (bolted and gasketed double wall duct section) per NFPA 80 and labeled "FIRE DAMPER", "SMOKE DAMPER", or "FIRE-SMOKE DAMPER" as appropriate.

Ceiling radiation dampers shall be installed in accordance with the details listed in the fire-resistance-rated assembly and the manufacturer's installation instructions and listing.

- 3.2 Fire and smoke dampers shall be installed in conformance with manufacturer's instructions and SMACNA recommendations. Dampers shall be installed in sheet metal wall or floor sleeves along with retaining angles and duct access doors or panels. Sleeve and duct connections shall be breakaway type or rigid type with corresponding gauge requirements in accordance with the manufacturer's instructions and SMACNA recommendations. Provide a duct access door for each damper, minimum 12"x12" or removable duct section (bolted and gasketed double wall duct section) per NFPA 80 and labeled "FIRE DAMPER", "SMOKE DAMPER", or "FIRE-SMOKE DAMPER" as appropriate.

Ceiling radiation dampers shall be installed in accordance with the details listed in the fire-resistance-rated assembly and the manufacturer's installation instructions and listing.

- 3.3 Coordinate Smoke detectors associated with smoke dampers and required power source for smoke dampers. Coordinate with the smoke detector manufacturer the minimum duct size and velocity requirements for proper detector operation prior to duct installation. Provide any required duct changes for smoke detector installation. Provide duct access doors and ceiling access panels for inspection of each smoke detector and insertion tube. Smoke detector initiation signals or smoke zone inputs associated with smoke dampers shall be provided to the building's automatic temperature controls from the fire alarm system. Extend power from sources (J-boxes) provided under Division 26. Provide control wiring, relays and control functions as part of the building's automatic temperature controls.

- 3.4 Fire dampers and smoke dampers and associated access doors shall be so arranged and located such that the spring catch and fusible link, operators and reset buttons are accessible when the damper is closed.
- 3.5 Accessibility of each fire damper shall be demonstrated to the Owner by disconnecting the link, closing the damper, reopening and re-attachment of the fusible link. Operation of each smoke damper shall also be demonstrated.
- 3.6 Each smoke damper end switch shall be extended to the B.A.S. for monitoring/status purposes. Coordinate with the B.A.S.
- 3.7 Each smoke damper and fire/smoke damper test station shall be mounted in a double-deep j-box recessed in the ceiling below its associated damper. Power wiring to the damper shall be extended thru the test station in accordance with damper manufacturer's wiring instructions. Wiring shall be included in Division 23 / 26 / 27, run in conduit.

Fire damper proving switches shall be installed, adjusted for proper operation and tested.

END OF SECTION



**23 37 00 AIR OUTLETS AND INLETS**

**PART 1 - GENERAL**

- 1.1 Air outlet and inlet devices include grilles, registers, diffusers, and special air diffusion devices associated with ceiling and lighting systems.
- 1.2 Refer to the schedule on the drawings for description, catalog numbers, materials, finishes, accessories, mounting and other details of the devices required.
- 1.3 Supply air devices in ceilings shall have their backsides externally insulated for condensation control unless already internally insulated. This external insulation shall be field installed, same as that specified for supply air ductwork / factory installed, minimum R-4.2 mineral fiber with foil jacket.

**PART 2 - PRODUCTS**

- 2.1 Air distribution devices other than louvers and specialty products shall be Titus, Tuttle & Bailey, Kreuger, or Price. All devices of a common type shall be by the same manufacturer.
- 2.2 Air outlet and inlet devices shall be equal to those specified by catalog number and description in the schedule on the drawings. Dampers shall be galvanized steel, unless otherwise noted, opposed blade configuration. Damper operators shall be concealed screw type. An auxiliary mounting frame shall be furnished with each grille and register except those mounted on exposed ducts or in lay in application.
- 2.3 Linear "T" bar air supply diffusers shall be slotted diffusers with fixed air pattern control complete with a galvanized sheet metal supply plenum having a round or oval duct connection and 0.50 inch neoprene coated fiberglass insulation on the interior. The unit shall be designed to mount on or alongside the ceiling "T" bar and shall include flanges on both sides of the diffuser to support the ceiling tiles. Provide additional "T" bars matching those of the ceiling system if the diffuser does not have these flanges. Units shall have a center notch where required to accommodate intervening "T" bars. Linear diffuser manufacturer shall be same as the other air devices.

**PART 3 - EXECUTION**

- 3.1 Verify & ensure compatibility of ceiling mounted devices with the ceilings and suspension systems (lay in, concealed spline, plaster, drywall, etc.). Verify with the architectural drawings.
- 3.2 Carefully align square and rectangular devices with the vertical and horizontal building lines. Diffusers shall be attached rigidly to the ductwork. Where connected by flexible ducts, special supports shall be provided as required, either from the ceiling suspension system or by independent suspension wires or rods from the building structure.
- 3.3 Externally insulate the backsides of supply air devices that are mounted in ceilings and not internally insulated. Insulation shall comply with 23 07 13 DUCT INSULATION.
- 3.4 Factory insulation on supply diffusers that is damaged prior to or during installing shall be repaired.
- 3.5 Inside of ducts behind grilles, registers and diffusers shall be painted flat black, as needed, to eliminate the sight of shiny surfaces.
- 3.6 Louver assemblies shall be installed in strict accordance with manufacturer's recommendations. Louvers to be installed plumb, square, level and true. Blank off all unused portions of the louver

with 14 ga. aluminum and insulate blank off with 1 inch rigid foil faced insulation. Seal blank off areas air tight.

END OF SECTION

**26 05 01 BASIC ELECTRICAL REQUIREMENTS**

**PART 1 - GENERAL**

1.1 Special Note

- A. All provisions of the Bidding Requirements, General Conditions and Supplementary Conditions, including Division 00 and Division 01, apply to work specified in this Division.
- B. The scope of the Division 26 work includes furnishing, installing, testing and warranty of all Division 26, 27 and 28 work and complete systems as shown on the Division 26, 27 and 28 drawings and as specified in Division 26, 27 and 28 and elsewhere in the project documents.
- C. Understanding that the contractors for various Divisions are sub-contractors to the Prime Contractor, assignments of work by division are not intended to restrict the Prime Contractor in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.
- D. The project drawings and specifications define scope of work for the various divisions. Such assignments of work are not intended to restrict the Construction Manager in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.

1.2 Permits and Regulations

- A. Include payment of all permit and inspection fees applicable to the work in this Division. Furnish for the Owner certificates of approval from the governing inspection agencies, as a condition for final payment.
- B. Work must conform to the National Electrical Code, National Electrical Safety Code and other applicable local, state and federal laws, ordinances and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. Install no work contrary to minimum legal standards.
- C. All electrical work shall be inspected and approved by the local jurisdictional authority.
- D. All electrical work shall be inspected and approved by the Ohio Division of Industrial Compliance who will issue the inspection certificate.
- E. Upon completion of work, the Contractor shall furnish to the consulting State Architect the certificate of inspection and approval before final payment on contract will be allowed.
- F. Final acceptance of all work will also be subject to the approval of the College Planning and Construction Department.

1.3 Inspection of Site

- A. Inspect the project site and the premises of the existing building. Conditions shall be compared with information shown on the drawings. Report immediately to the Architect any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

#### 1.4 Drawings and Specifications

- A. The drawings indicate the general arrangement of the work and are to be followed insofar as possible. The word "provide", as used, shall mean "furnish and install". If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Architect for approval before proceeding with the work.
- B. Make all necessary field measurements to ensure correct fitting. Coordinate work with all other trades in such a manner as to cause a minimum of conflict or delay.
- C. The drawings and specifications shall be carefully studied during the course of bidding and construction. Any errors, omissions or discrepancies encountered shall be referred immediately to the Architect for interpretation or correction, so that misunderstandings at a later date may be avoided. The contract drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Having bus duct, wireways and fittings fabricated and delivered in advance of making actual measurements shall not be sufficient cause to avoid making offsets and minor changes as may be necessary to install bus duct, wireways, fittings and equipment.
- D. The Architect shall reserve the right to make minor adjustment in locations of system runs and components where he considers such adjustments desirable in the interest of protecting and concealing work or presenting a better appearance where exposed. Any such changes shall be anticipated and requested sufficiently in advance as to not cause extra work, or unduly delay the work. Coordinate work in advance with all other trades and report immediately any difficulties which can be anticipated.
- E. Equipment, ductwork and piping shall not be installed in the dedicated electrical space above or in the working space required around electrical switchgear, motor control centers or panelboards as identified by NEC 110.26 Spaces about Electrical Equipment – 600 Volts Nominal or Less. For equipment rated over 600 volts nominal – 110.32 Work Space About Equipment – 110.33 Entrance to Enclosures and Access to Work Space – 110.34 Work Space and Guarding. Caution other trades to comply with this stipulation.
- F. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict. The Architect's decision shall be final in regard to the arrangement of bus duct, conduit, etc., where conflict arises.
- G. Provide offsets in system runs, additional fittings, necessary conduit, pull boxes, conductors, switches and devices required to complete the installation, or for the proper operation of the system. Exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- H. Should overlap of work among the trades become evident, this shall be called to the attention of the Architect. In such event, none of the trades or their suppliers shall assume that he is relieved of the work which is specified under his branch until instructions in writing are received from the Architect.

#### 1.5 Asbestos Materials

- A. Abatement, removal or encapsulation of existing materials containing asbestos is not included in the Division 26 Contract. Necessary work of this nature will be arranged by the Owner to be done outside of this construction and remodeling project by a company regularly engaged in



asbestos abatement. Such work will be scheduled and performed in advance of work in the construction and remodeling project.

- B. If, in the performance of the work, materials are observed which are suspected to contain asbestos, the Contractor shall immediately inform the Architect who in turn will notify the Owner. Work that would expose workers to the inhalation of asbestos particles shall be terminated. Work may be resumed only after a determination has been made and unsafe materials have been removed or encapsulated and the area declared safe.

#### 1.6 Coordination Drawings

- A. The Division 23 Contractor shall initially prepare and be responsible for 0.25 inch scale coordination drawings. These drawings shall be produced using a computer aided drafting software of a mutually agreed upon format and distributed to the Division 21, 22, 23, 26, 27 and 28 Contractors. Each Contractor shall prepare their own electronic drawings, using common backgrounds obtained from the Architect and Structural Engineer. The Division 23 Contractor shall be responsible for consolidating (merging) the drawings into combined coordination drawings, and lead the conflict resolution process, with all contractors working together to obtain finished coordinated drawings. No work shall be installed until all contractors have approved and signed-off with their approval and drawings have been submitted and reviewed by the Engineer.
- B. Review by the Engineer is cursory. It is the Contractors responsibilities to ensure that all work is coordinated, including fit above ceilings and that specified ceiling heights are maintained.

#### 1.7 Inspection

- A. All work shall be subject to inspection of Federal, State and local agencies as may be appropriate, and of the Architect and Engineer.
- B. Obtain final inspection certificates and turn over to the Owner.

#### 1.8 Record Drawings

- A. Maintain a separate set of field prints of the contract documents and hand mark all changes or variations, in a manner to be clearly discernible, which are made during construction. Upon completion of the work and within 90 days of system acceptance, these hand marked drawings shall be turned over to the Architect. This shall apply particularly to underground and concealed work, and to other systems where the installation varies to a degree which would justify recording the change.

#### 1.9 Operating and Maintenance Manuals

- A. Assemble three copies each of operating and maintenance manuals for the Electrical work.
- B. All "approved" shop drawings and installation, maintenance and operating instruction pamphlets or brochures, wiring diagrams, parts list, and other information, along with warranties, shall be obtained from each manufacturer of the principal items of equipment. In addition, prepare and include a chart listing all items of equipment which are furnished under this contract, indicating the nature of maintenance required, the recommended frequency of checking these points and the type of lubricating media or replacement material required. Name and address of a qualified service agency. A complete narrative of how each system is intended to operate. Major items of equipment shall consist of not less than the following:

1. Motor controllers.
  2. Specialty equipment.
  3. Fire alarm, communications and sound systems.
  4. Lighting equipment and lighting controls.
- C. Standard NEMA publications on the operation and care of equipment may be furnished in lieu of manufacturer's data where the manufacturer's instructions are not available.
- D. Original purchase order number; date of purchase; name, address, and phone number of the vendor; warranty information.
- E. Copy of required test reports.
- F. These shall be assembled into three-ring loose leaf binders or other appropriate binding. An index and tabbed sheets to separate the sections shall be included. These shall be submitted to the Engineer for review. Upon approval and within 90 days of system acceptance, manuals shall be turned over to the Owner.

#### 1.10 Final Inspection and Punch List

- A. As the time of work completion approaches, survey and inspect Division 26 work and develop a punch list to confirm that it is complete and finished. Then notify the Architect and request that a final inspection be made. It shall not be considered the Architect's or Engineer's obligation to perform a final inspection until the Contractor has inspected the work and so states at the time of the request for the final inspection.
- B. Requests to the Architect and Engineer for final inspection may be accompanied by a limited list of known deficiencies in completion, with appropriate explanation and schedule for completing these; this is in the interest of expediting acceptance for beneficial occupancy.
- C. The Architect and/or Engineer will inspect the work and prepare a punch list of items requiring correction, completion or verification. Corrective action shall be taken by the Contractor to the satisfaction of Architect and Engineer within 30 days of receipt of the Architect/Engineer's punch list.

#### 1.11 Warranty

- A. Warrant all workmanship, equipment and material entering into this contract for a period of one (1) year from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Use of equipment for temporary electric is not the start of the warranty period.
- B. This provision is intended specifically to cover deficiencies in contract completion or performance which are not immediately discovered after systems are placed in operation. These items include, but are not limited to, motor controller malfunction, heater element changes required for motor controller, fuse replacement where fuses blow due to abnormal shorts, adjustments and/or replacement of malfunctioning equipment and adjusting special equipment and communication systems to obtain optimum performance.
- C. This provision shall not be construed to include maintenance items such as making normally anticipated adjustments or correcting adjustment errors on the part of the Owner's personnel.

- D. Provisions of this warranty shall be considered supplementary to warranty provisions under Division 01 General Conditions.

1.12 Project Close-Out

- A. The following schedule summarizes actions to be taken or submittals to be completed prior to issuance of the Contract Completion Certificates. Refer to Division 01 -General Requirements, and applicable paragraphs of this Section and the applicable trade Divisions for additional requirements. This information should be submitted at least thirty days in advance of request for final inspection. Where possible, the information shall be bound in 8.50 inch x 11 inch hard back binders.

ITEM	SPEC SECTION
1) Materials/Suppliers List	26 05 01
2) Record Drawings	26 05 01
3) Certificate of Inspection	26 05 01
4) Electrical Tests and Adjustments	26 05 01
5) Operating Instructions and Maintenance Manuals	26 05 01
6) Identification Nameplates	26 05 53
7) Color Coding of Conduits	26 05 53
8) Receipt for Spare Fuses	26 28 13
9) Fuse Identification	26 28 13
10) Receipt for Keys:	
a) Panelboards	26 24 16
11) Complete Punch List	26 05 01
12) Waiver of Liens	Div. 01
13) Ground Fault and Overcurrent Protection System Recommended	26 11 16,
Settings and Coordination	26 13 16, 26 13 19, 26 24 13
14) Affidavit of Wage Compliance	Div. 01
15) Change Orders and Allowance Adjustment	Div. 01

**PART 2 - PRODUCTS**

2.1 Materials and Equipment

- A. Materials and equipment furnished shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.
- B. All electrical equipment and wiring shall bear the Underwriters Laboratories, Inc. label where UL labeled items are available, and shall comply with NEC (NFPA-70) and NFPA requirements.

2.2 Reference Standards

- A. Where standards (NFPA, NEC, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the Authority Having Jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

## 2.3 Equipment Selection

- A. The selection of materials and equipment to be furnished shall be governed by the following:
  - 1. Where trade names, brands, or manufacturers of equipment or materials are listed in the specification, the exact equipment listed shall be furnished. Where more than one name is used, the Contractor shall have the option of selecting between any one of the several specified. All products shall be first quality line of manufacturers listed.
  - 2. Where the words "or approved equal" appear after a manufacturer's name, specific approval must be obtained from the Engineer during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.
  - 3. Where the words "equal to" appear, followed by a manufacturer's name and sometimes a model or series designation, such designation is intended to establish quality level and standard features. Equal equipment by other manufacturers will be acceptable, subject to the Engineer's approval.
- B. Substitute equipment of equal quality and capacity will only be considered when the listing of such is included as a separate item of the bid. State the deduction or addition in cost to that of the specified product.
- C. Within ten (10) days after award of contract, the names of Subcontractors and manufacturers of the major items of equipment which are proposed shall be submitted to the Architect / Construction Manager for approval. Refer to the list of equipment below.
- D. Before bidding equipment, and again in the preparation of shop drawings, verify that adequate space is available for entry and installation of the item of equipment, including associated accessories. Also verify that adequate space is available for servicing of the equipment and that required NEC clearances are met.
- E. If extensive changes in conduit, bus duct, equipment layout or electrical wiring and equipment are brought about by the use of equipment which is not compatible with the layout shown on the drawings, necessary changes shall be deemed to be included in this contract.

## 2.4 Shop Drawings

- A. Electronic copies of shop drawings and descriptive information of equipment and materials shall be furnished. Submit to the Architect and/or Engineer for review as stated in the General Conditions and Supplementary Conditions. These shall be submitted as soon as practicable and before equipment is installed and before special equipment is manufactured. Submittal information shall clearly identify the manufacturer, specific model number, approval labels, performance data, electrical characteristics, features, specified options and additional information sufficient to evidence compliance with the contract documents. Product catalogs, brochures, etc. submitted without project specific items marked as being submitted for review will be rejected and returned without review. Shop drawings for equipment, fixtures, devices and materials shall be labeled and identified same as on the Contract Documents. If compliance with the above criteria is not provided shop drawings will be subject to rejection and returned without review. Samples shall be submitted when requested or as specified here with-in.
- B. The review of shop drawings by the Architect or Engineer shall not relieve the Contractor from responsibility for errors in the shop drawings. Deviations from specifications and drawing requirements shall be called to the Engineer's attention in a separate clearly stated notification at the time of submittal for the Engineer's review.

C. Shop drawings of the following equipment and materials shall be submitted:

1. Wireway.
2. Cable trays and firestopping.
3. Miscellaneous cabinets.
4. Wiring devices and coverplates.
5. Surge suppression.
6. Panelboards.
7. Cabinets and enclosures.
8. Fuses.
9. Motor controllers and disconnects.
10. Lighting fixtures.
11. Lighting controls
12. Fire alarm system.

### **PART 3 - EXECUTION**

#### 3.1 Testing

- A. As each wiring system is completed, it shall be tested for continuity and freedom from grounds.
- B. As each electrically operated system is energized, it shall be tested for function.
- C. On all electric services including change-outs, backfeeds, etc. the Contractor shall verify phase rotation and voltage readings to ensure the final installation is proper. Submit to the Engineer in writing a record of voltage readings and current readings taken at no-load and fully loaded conditions.
- D. The Contractor shall perform megger and resistance tests and special tests on any circuits or equipment when an authorized inspection agency suspects the system's integrity or when requested by the Architect or Engineer.
- E. All signaling and communications systems shall be inspected and tested by a qualified representative of the manufacturer or equipment vendor. Submit four (4) copies of reports indicating results.
- F. Tests shall be witnessed by field representatives of the Architect or Engineer or shall be monitored by a recorder. Furnish a written record of each system test indicating date, system, test conditions, duration and results of tests. Copies of all test reports shall be included in the O&M manuals.
- G. Instruments required for tests shall be furnished by the Contractor.

#### 3.2 Equipment Cleaning

- A. Before placing each system in operation, the equipment shall be thoroughly cleaned; cleaning shall be performed in accordance with equipment manufacturer's recommendations.
- B. Refer to appropriate Sections for cleaning of other equipment and systems for normal operation.

### 3.3 Operation and Adjustment of Equipment

- A. As each system is put into operation, all items of equipment included therein shall be adjusted to proper working order. This shall include balancing and adjusting voltages and currents; verifying phase rotation; setting breakers, ground fault and other relays, controllers, meters and timers; and adjusting all operating equipment.
- B. Caution: Verify that all bearings of equipment furnished are lubricated, all motors are operating in the right direction, and correct drive settings and overload heater elements are provided on all motors. Do not depend wholly on the other trades judgment in these matters. Follow specific instructions in regard to lubrication of equipment furnished under this Contract.

### 3.4 Operating Demonstration and Instructions

- A. Set the various systems into operation and demonstrate to the Owner and Architect / Engineer that the systems function properly and that the requirements of the Contract are fulfilled.
- B. Provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems. A thorough review of the operating and maintenance manuals shall be included in these instructional meetings.
- C. O & M manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.
- D. A minimum of 8 hours shall be allowed for instructions to personnel selected by the Owner. Instructions shall include not less than the following:
  - 1. Show location of items of equipment and their purpose.
  - 2. Review binder containing instructions and equipment and systems data.
  - 3. Coordinate written and verbal instructions so that each is understood by personnel.
  - 4. Separate instructions shall be given by manufacturer's representatives for the various special and communications systems.
- E. A minimum of 48 hours continuous trouble-free operating time shall be acceptable to prove that the systems function properly.

END OF SECTION

**26 05 02      AGREEMENT AND WAIVER FOR USE OF ELECTRONIC FILES**

**PART 1 - GENERAL**

- 1.1 The Engineer, at his sole discretion and without obligation, makes graphic portions of the contract documents available for use by the contractor in electronic format. These electronic files are proprietary, and remain the Engineer's Instruments of Service and shall be for use solely with respect to this project, as provided in the Standard Form of Agreement between Owner/Architect and Engineer.
- 1.2 Electronic files shall be released only after bids have been received for the project and contracts have been signed with the contractors.
- 1.3 The contractor shall acknowledge receipt of electronic files in the requested format for this project. The electronic files are provided as a convenience to the User, for use in preparing shop drawings and/or coordination drawings related to the construction of only the project identified in the Agreement. The electronic files and the information contained within are the property of the Engineer and/or the Architect and/or the Owner, and may not be reproduced or used in any format except in conjunction with the project identified in the Agreement.
- 1.4 The User acknowledges that the information provided in the electronic files is not a substitution or replacement for the Contract Documents and does not become a Contract Document. The User acknowledges that neither the Engineer, the Architect, the Consultants, the Client or the Owner make any warrant or representation that the information contained in the electronic files reflect the Contract Documents in their entirety. The User assumes full responsibility in the use of the electronic files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
- 1.5 The User acknowledges that the receipt of electronic files in no way relieves the User from the responsibility for the preparation of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
- 1.6 Electronic files are available in a .DWG or .RVT format for a cost as indicated in the Agreement and Waiver Form. **Providing the documents in a .DWG version that differs from the product version that the .DWG files were initially created in will incur additional charges per sheet, as indicated in the Agreement and Waiver Form.** Charges are for the Engineer's time to prepare the documents in the format stated. They are available through the Engineer's office on a C.O.D. basis only. A sample of the format will be provided by the Engineer upon request by the contractor, for the purpose of testing the compatibility of the format to the contractor's systems.
- 1.7 All drawings will be in an AutoCAD file format, when requested to be .DWG format.
- 1.8 All project models will be furnished without views.
- 1.9 All electronic files shall be stripped of the Project's name and address, the Architect's and Engineer's and any consultant's name and address, and any professional licenses indicated on the contract documents, (and all dimensions, verbiage, and statistical information). Use of these electronic files is solely at the contractor's risk, and shall in no way alter the contractor's Contract for Construction.
- 1.10 The User agrees to indemnify, hold harmless and defend the Engineer, the Architect, the Consultants, the Owner, the Client and any of their agents from any litigation resulting from the use of (by any means of reproduction or electronic media) these files. The Engineer makes no

representation regarding fitness for any particular purpose, or suitability for use with any software or hardware, and shall not be responsible or liable for errors, defects, inexactitudes, or anomalies in the data, information, or documents (including drawings and specifications) caused by the Engineer's or its consultant's computer software or hardware defects or errors; the Engineer's or its consultant's electronic or disk transmittal of data, information or documents; or the Engineer's or its consultant's reformatting or automated conversion of data, information or documents electronically or disk transmitted from the Engineer's consultants to the Engineer.

- 1.11 The contractor waives all claims against the Engineer, its employees, officers and consultants for any and all damages, losses, or expenses the contractor incurs from such defects or errors in the electronic files. Furthermore, the contractor shall indemnify, defend, and hold harmless the Engineer, and its consultants together with their respective employees and officers, harmless from and against any claims, suits, demands, causes of action, losses, damages or expenses (including all attorney's fees and litigation expenses) attributed to errors or defects in data, information or documents, including drawings and specifications, resulting from the contractor's distribution of electronic files to other contractors, persons, or entities.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

- 3.1 Attached "Agreement" shall be submitted with accompanying payment to the Engineer prior to delivery of electronic files.

END OF SECTION





**26 05 02A**  
**ELECTRONIC FILES HEAPY RELEASE FORM TO CONTRACTORS**

**Project:** Sinclair Community College  
EMS Classroom-SIM LAB  
444 West Third St  
Dayton, OH 45402

**Owner:** Sinclair Community College

**Heapy Engineering Project Number:** 2024-06062

**Heapy Engineering Project Manager:** Nick Andrews

The Provider, named below, will furnish the Recipient, named below, certain documents prepared by the Provider or its sub consultants in an electronic format. These documents are hereinafter collectively referred to as "Electronic Files". The Electronic Files are instruments of the Provider services performed solely for the Owner's benefit and to be used solely for this Project. The Provider does not represent that the information contained in the Electronic Files are suitable for use on any other project or for any other purpose. If the Electronic Files are used for any other project or purpose without the Provider's specific written permission, the risk of such use shall be assumed solely by the Recipient or other user.

**Prior to the use of the Electronic Files the Provider and the Recipient agree to the following terms and conditions:**

1. The Provider and Recipient fully understand that the data contained in these electronic files are part of the Provider's Instruments of Service. The Provider shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.
2. The Recipient confirms their request to the Provider for Electronic Files for the Project listed above, which the Recipient understands are to be provided only in accordance with, and conditioned upon, the terms and conditions of the Agreement and Waiver for Use of Electronic Files).
3. The Provider agrees that the Recipient may use the Electronic Files for the sole purpose of preparing shop drawings and/or coordination drawings for the above Project only. Any Electronic Files provided are strictly for the use of the Recipient in regard to the Project named above, and shall not be utilized for any other purpose or provided by the Recipient to any entity other than its subcontractors for the Project named above.
4. The Recipient acknowledges that the furnishing of Electronic Files in no way relieves the Recipient from the responsibility of shop drawings or other schedules as set forth in the Contract between the Contractor and the Owner.
5. The Recipient acknowledges:
  - a. That the Electronic Files do not contain all of the information of the Bid Documents or Contract Documents for the construction of the Project above.

- b. That information in the Bid Documents or Contract Documents may be revised or modified in the future.
  - c. The Provider does not have, and will not have, any duty or obligation to advise or give notice to the Recipient of any such revisions or modifications.
  - d. That the Recipient agrees that its use of the Electronic Files is at the Recipient's sole risk of liability, and that the Recipient shall make no claim or demand of any kind against the Provider arising out of Recipient's receipt or use of the Electronic Files.
6. The Provider makes no representation or warranty of any kind, express or implied, with respect to the Electronic Files and specifically makes no warranty that the Electronic Files shall be merchantable or fit for any particular purpose, or accurate or complete. Furthermore, any description of said Electronic Files shall not be deemed to create an implied or express warranty that such Electronic Files shall conform to said description.
  7. Due to the unsecured nature of the Electronic Files and the inability of the Provider or the Recipient to establish controls over their use, the Provider assumes no responsibility for any consequences arising out of the use of the data. It is the sole responsibility of the Recipient to check the validity of all information contained within the Electronic Files. The Recipient shall at all times refer to the Construction Documents of the project during all phases of the project. The Recipient shall assume all risks and liabilities resulting from the use of this data, and the Recipient agree(s) to waive any and all claims and liability against the Provider and its sub consultants resulting in any way from the use of the Electronic Files.
  8. Electronic Files are provided strictly as a courtesy by the Provider solely for the convenience of the Recipient, and are not part of the Bid Documents or Contract Documents for the Project. The Electronic Files do not replace or supplement the paper copies of any drawings, specifications, or other documents included in the Contract Documents for use on the project.
    - a. The Recipient assumes full responsibility in the use of Electronic Files, including the responsibility to see that all manual modifications, addenda, bulletins, clarifications and Change Orders to the drawings executed as a part of the Contract Documents have been incorporated.
  9. As stated herein, the possibility exists that the Electronic Files provided may differ from the Bid Documents or Contract Documents for construction of the Project. The Provider shall not be responsible, nor be held responsible, for differences between Electronic Files, the Bid Documents, and Contract Documents. The Bid Documents or Contract Documents for the Project may be modified by the Provider at any time, either before or after construction begins. The Provider has no responsibility, either before or after any such modification, to determine or to advise the Recipient whether any such modification causes Electronic Files provided to the Recipient to be out of date, inconsistent with the Bid Documents or Contract Documents, or otherwise unsuitable or unfit for use in any way.
  10. The Recipient assumes all risk and liability for any losses, damages, claims, or expenses (including defense and attorney fees) resulting from its receipt, use, or possession of Electronic Files furnished by the Provider. The Provider makes no representation, warranty or guarantee that the Electronic Files:
    - a. Are suitable for any other usage or purpose.
    - b. Have any particular durability.
    - c. Will not damage or impair the Recipient's computer or software.
    - d. Contain no errors or mechanical flaws or other discrepancies that may render them unsuitable for the purpose intended by the Recipient.

11. Recipient agrees to indemnify, defend and hold harmless the Provider, agents, employees, and the Owner from, and against, any and all claims, suits, losses, damages or costs, of any kind or nature, including attorney's fees, arising from or by reason of the Recipient's use of Electronic Files provided by the Provider, and such defense and indemnification obligation duties shall survive any use under this Agreement and Waiver for Use of Electronic Files.
12. The Recipient agrees that the Provider shall have no responsibility whatsoever for problems of any nature arising from transmitting and storing electronic files at a Recipient requested FTP or project management site or the conversion of the Electronic Files by the Recipient or others for use in non-native applications. The Provider will not provide Electronic Files in compressed formats. Recipient agrees to accept the files in the format provided by the Provider, and that Recipient's conversion or electronic file storage at the Recipient's requested site, shall be at Recipient's sole risk.
13. Recipient acknowledges:
  - a. That the Electronic Files provided by the Provider are a graphical representation of the building in order to generate two-dimensional industry standard drawings.
  - b. That the data contained in the Electronic Files may not be 100% accurate and should not be used for dimensional control, building layout, shop drawings, or any other similar purpose
  - c. That any schedule of materials produced directly from the Electronic Files has not been checked for accuracy.
  - d. That the information in the Electronic Files should be used only for comparative purposes and shall not be relied upon for accurate quantity estimates or used in establishing pricing.
14. Electronic Files provided by the Provider will only contain elements and content that the Provider deems necessary and appropriate to share. No specific Level of Development (LOD) is implied or expected. The Recipient agrees that no proprietary content, MvParts or Revit Families or any other AutoCAD MEP or Revit MEP content shall be removed from the model and/or used for any other purpose but to support this specific project.
15. The Provider, at its sole discretion, may modify the Electronic files before they are provided to the Recipient. Such modifications may include, but are not necessarily limited to, removal of certain information. The Provider, at its sole discretion, may refuse to provide some or all Electronic Files requested by Recipient.
16. The availability of Electronic Files that were not prepared by the Provider is subject to the consent of the Owner or consultant that prepared those Electronic Files. The Provider will not negotiate with the Owner or consultant or repeatedly solicit the Owner or consultant to obtain such consent. Neither this Agreement and Waiver for Use of Electronic Files nor any such separate Consultant's consent may be assigned or transferred by Recipient to any other person or entity.

Provider (Name of Company): \_\_\_\_\_

Recipient (Name of Company): \_\_\_\_\_

Recipient Address: \_\_\_\_\_

Name of authorized Recipient Representative: \_\_\_\_\_

Title of authorized Recipient Representative: \_\_\_\_\_

E-mail address of authorized Recipient Representative: \_\_\_\_\_

Signature of authorized Recipient Representative: \_\_\_\_\_

Date: \_\_\_\_\_

NOTE: Select requested Electronic File Format, File Transfer Medium and complete applicable Cost Summary.

**A. Electronic File Format (select one):**

1.  .DWG Format - List of Drawings Requested: \_\_\_\_\_

2.  Revit Project Model Requested (Model only, no Views included)

**B. File Transfer Medium (select one):**

CD-ROM     DVD-ROM     Heapy FTP     User's FTP site     Flash Drive

**C. Delivery of Electronic Files Cost Summary:**

Available Electronic .DWG file format:

2022 DWG

If a different file version is required than the indicated available version state the requested version:

\_\_\_\_\_ .DWG

**Note that an additional charge per sheet will be incurred.**

Cost of Preparation of Division 26 Electronic .DWG Files:

First Drawing: \$50.00 \$50.00

Additional Drawings \$15.00 each \_\_\_\_\_ x \$15.00 = \$ \_\_\_\_\_

Conversion to .DWG version different from available .DWG:  
\$5.00 additional/sheet \_\_\_\_\_ x \$ 5.00 = \$ \_\_\_\_\_

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_

All files will be bound together.

Available electronic Revit file format:

2022 .RVT

Cost of Preparation of Division 26 Electronic Revit Model Files:

Revit Project Model without Views \$500.00

Total Cost: (Please make check payable to Heapy Engineering and include a copy of this form.) \$ \_\_\_\_\_

**26 05 04 BASIC ELECTRICAL MATERIALS AND METHODS**

**PART 1 - GENERAL**

1.1 Temporary Electric Services

- A. The temporary power and temporary lighting for construction is provided by the Contractor. Refer to Division 01 - General Requirements.
- B. The Contractor is cautioned to carefully consider the possible sources of temporary electric power and the probable location of the General Contractor's office.
- C. The Contractor shall furnish, install and pay for all necessary conduit, wire, metering, switches, receptacles, lights and accessories to provide temporary electric power and lighting for locations as specified by the General Contractor.
- D. Consult owner for fees/metering required and include same in Electrical Contract.
- E. Labor, receptacles, boxes, fixtures, wire, etc. required by the various Contractors inside their offices shall be paid for by the respective Contractors.
- F. Lighting fixtures shall be placed every 20 ft. along each corridor or where corridors do not occur, along the long axis of all rooms and areas greater than 15 ft. in length. Provide a 200 watt lamp in a rubber coated socket with wire guard, spliced into branch feeder conductor at every 20 ft. The branch circuit wiring may be 3 wire type "NMC" and the wire guard shall be bonded to the ground conductor. Receptacle circuits shall consist of 1 gang handy box with grounded duplex receptacles a maximum of 25 ft. on center with a maximum of 4 per circuit. All receptacle circuits shall be protected by its own overcurrent device in a panelboard. Install wiring and equipment above 6 feet 6 inches and below the finished ceiling. Extend circuits as required and protect in an appropriate panelboard on each floor level. Provide GFCI protected receptacles and circuits as required by NEC and OSHA.
- G. Contractors requiring extension cords shall provide their own cords and plugs up to capacity of 20 amperes. For services to larger items of equipment and welders, this Contractor shall extend proper feeders as requested at the expense of the Contractors requiring the service.
- H. The Contractor shall maintain the temporary light and power system for the duration of the work and shall remove it from the site when directed. Temporary wiring and equipment shall remain the property of the Contractor.
- I. The use of the permanent electrical system for temporary services shall be allowed. Expedite completion of system as practicable to this end. Maintain the system during this period.
- J. Warranty periods on equipment, materials and systems shall commence upon Owner acceptance of the building or systems. Temporary use shall not jeopardize or alter warranty requirements.
- K. The complete temporary service shall comply with owner, OSHA, and all Code requirements.

## 1.2 Continuity of Service

- A. Work shall be so planned and executed as to provide reasonable continuous service of existing systems throughout the construction period. Where necessary to disrupt services for short periods of time for connection, alteration or switch over, the Owner shall be notified in advance and outages scheduled at the Owner's reasonable convenience.
- B. Submit, on request, a written step-by-step sequence of operations proposed to accomplish the work. The outline must include tentative dates, times of day for disruption, downtime and restoration of services. Submit the outline sufficiently in advance of the proposed work to allow the Architect or Engineer to review the information with the Owner. Upon approval, final planning and the work shall be done in close coordination with the Owner.
- C. Shutdown of systems and work undertaken during shutdown shall be bid as being done outside of normal working hours.

## PART 2 - PRODUCTS

### 2.1 Access Panels

- A. Provide ceiling and wall access panels where indicated on the drawings, or where otherwise required to gain access to concealed valves, traps, devices and equipment requiring service or adjustment.
- B. Access panels (refer to paragraph C. below for more specialized drywall ceiling access panels) shall be steel construction (except where aluminum or stainless steel is specified) with concealed hinge and door with tamperproof screws. Locks in "secured" areas of the building shall have tamperproof screws. Panels shall be 18 inches x 18 inches size unless larger panels are shown or required. Mounting frames shall be compatible with the material in which they are installed. Access panels shall be:
  - 1. Standard flush type with overlapping flange for masonry and tile walls, Milcor Style "M" or equal.
  - 2. Recessed type having the door recessed to accept a drywall panel insert, for drywall ceilings and walls, Milcor Style "ATR" or equal.
  - 3. Standard flush type for drywall ceilings and walls, Milcor Style "M" or equal.
- C. Access panels in drywall ceilings shall be glass reinforced gypsum drywall lay-in panels with flush mounting frames. Corners of panels shall be rounded. Panels shall be 18 inches x 18 inches unless larger panels are shown or required. Panels shall be equal to Chicago Metallic Model CRG.
- D. Access panels in fire rated shaft walls and in fire rated ceilings shall be "B" label or greater to match the rating of the wall or ceiling.
- E. Materials used in plenums shall be rated for plenum use conforming to the ASTM E84 25/50 smoke development and flame spread restrictions.

## PART 3 - EXECUTION

### 3.1 Workmanship

- A. Materials and equipment shall be installed and supported in a first-class and workmanlike manner by mechanics skilled in their particular trades. Workmanship shall be first-class in all

respects, and the Architect and Engineer shall have the right to stop the work if highest quality workmanship is not maintained.

- B. Electrical work shall be performed by a licensed Contractor in accordance with requirements of the jurisdiction.
- C. Recycle metals and plastics and provide weight ticket; include all documentation in the O&M manuals.
- D. All lamp and ballasts shall be properly disposed of; include all documentation of disposal inventory in the O&M manuals.

### 3.2 Protection

- A. The Contractor shall be entirely responsible for all material and equipment furnished in connection with his work. Special care shall be taken to properly protect all parts thereof from theft, damage or deterioration during the entire construction period in such a manner as may be necessary, or as directed by the Architect.
- B. The Owner's property and the property of other contractors shall be scrupulously respected at all times. Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

### 3.3 Cutting and Patching

- A. Refer to Division 01 - General Requirements for information regarding cutting and patching.
- B. Plan the work well ahead of the general construction. Where conduits, wireways, cable trays and bus ducts are to pass thru new walls, partitions, floors, roof or ceilings, place sleeves in these elements or arrange with the General Contractor to provide openings where sleeves are not practical. Where sleeves or openings have not been installed, cut holes and patch as required for the installation of this work, or pay other trades for doing this work when so directed by the Architect. Any damage caused to the building shall be repaired or rectified.
- C. Where conduits, wireways, cable trays and bus ducts are to pass thru, above or behind existing walls, partitions, floors, roof or ceiling, cutting, patching, refinishing and painting of same shall be included in this contract. Core drilling and saw cutting shall be utilized where practical. Contractor to examine where floors and walls etc. are to be cut for presence of existing utilities.
- D. When cutting or core-drilling floor verify location of existing electrical, plumbing or steel reinforcement. Use X-ray method to verify existence of obstructions. Either re-route existing system brace floor or alter location of new work to maintain existing system.
- E. All sleeves and openings not used or partially used shall be closed to prevent passage of fire or smoke.
- F. All materials, methods and procedures used in patching and refinishing shall be in accordance with applicable provisions of specifications governing the various trades, and shall be completed by skilled workmen normally engaged in these trades. The final appearance and integrity of the patched and refinished areas must meet the approval of the Architect. Wall, floor and ceiling refinishing must extend to logical termination lines (entire ceiling of the room repainted, for instance), if an acceptable appearance cannot be attained by finishing a partial area.

- G. Provide steel angle or channel lintels to span openings which are cut in existing jointed masonry walls where the opening span exceeds 16 inches. Provide framing around roof openings for required support of the roof deck.
- H. Engage a Roofing Contractor on a subcontract basis for roofing and roof insulation work necessitated by the Electrical work. The Roofing Sub-Contractor shall be certified for installation and repair of the roofing system so as to maintain the existing roofing warranty.

### 3.4 Removals, Alterations and Reuse

- A. Refer to the drawings for the scope of remodeling in the existing building.
- B. Cooperate with the General Contractor regarding all removal and remodeling work. The Contractor shall remove existing work which is associated with his trade, and which will be superfluous when the new system is installed and made operational. Void unused conduit behind walls or below floors as necessary or as directed. No wire or conduit shall be removed which will impair the functioning of the remaining work unless first replaced with a rerouted section of wire or conduit to ensure continuity. Remove inactive wiring back to the last active junction box, panelboard or piece of equipment.
- C. Upon completion, no unused conduit or stub shall extend thru floors, walls or ceilings in finished areas. Abandoned conduit where remaining in place shall have any unused wiring removed. All accessible unused conduit shall be removed.
- D. When it is necessary to reroute a section of an active circuit, the rerouted section shall be installed before removing the existing in order to minimize system down time. Rerouted sections shall be installed as required for new work.
- E. Materials and equipment which are removed shall not be reused within the scope of this project unless specifically noted to be relocated or reused. Turn over to the Owner and place where directed on the premises all removed material and equipment so designated by the Owner. All material and equipment not claimed by the Owner shall become the property of the Contractor responsible for removal and shall be removed from the premises.
- F. Remove, store and reinstall lay-in ceiling tile and grid as needed to perform work in areas where such removal and re-installation is not to be done by the General Contractor. Damaged tile and/or grid shall be replaced with new matching tile and/or grid.
- G. In areas of minor work where the space is not completely vacated, temporarily move portable equipment and furnishings within the space as required to complete the work. Coordinate this activity with Owner. Protect the Owner's property by providing dust covers and temporary plastic film barriers to contain dust. Remove barriers and return equipment and furniture upon completion of the work.
- H. Refinish any surface disturbed under this work to match existing, except where refinishing of that surface is included under the General Contract.

### 3.5 Painting

- A. In addition to any painting specified for various individual items of equipment, the following painting shall be included in Division 26:
  - 1. Ferrous metal which is not factory or shop painted or galvanized and which remains exposed to view in the building including finished areas, mechanical rooms, storage



- rooms, and other unfinished areas shall be given a prime coat of paint and two finish coats of paint.
2. Ferrous metal installed outside the building which is not factory or shop painted or galvanized shall be given a prime coat of paint and two finish coats of paint.
  3. Equipment and materials which have been factory or shop coated (prime or finished painted or galvanized), on which the finish has been damaged or has deteriorated, shall be cleaned and refinished equal to its original condition. The entire surface shall be repainted if a uniform appearance cannot be accomplished by touch up.
  4. Apply Z.R.C. Galviline cold galvanizing compound, or approved equal, for touch-up and repair of previously galvanized surfaces.
  5. Each backboard shall be painted with a minimum of two coats of flame retardant paint, all sides; gray enamel primer with gray matte enamel finish.
- B. Paint, surface preparation and application shall conform to applicable portions of the Painting section of Division 09 of the Specifications. All rust must be removed before application of paint.
- C. Finish painting is included in the General Contract except where otherwise required under remodeling work. Refer to the Cutting and Patching paragraph in this Section for finishing requirements.

### 3.6 Access Panels

- A. Install access panels or pay general trade to do so. Final appearance is subject to approval by the Architect or Engineer.
- B. Access locations thru HVAC ductwork must be coordinated with the ductwork installer. Location of the hinged access door with latch must be coordinated in advance with the HVAC Contractor.
- C. Location of access panels shall be planned to clear ceiling lights, ceiling support grids and other obstructions so as to allow, wherever possible, full shoulder clearance beside the device to be inspected, adjusted or repaired.
- D. Panels with recessed doors are to be fitted with insert panels of drywall or, those for plaster, infilled with plaster. Caution the Installing Contractor to provide appropriate framing with drywall or plaster beading to ensure a finished appearance. Shim strips may be required to bring the insert panel flush with the plane of the door and wall / ceiling.

### 3.7 Backboards

- A. Where shown on the drawings, backboards shall be provided for wall mounting of disconnect switches, devices and communications equipment. The Contractor may opt to mount additional groups of disconnect switches on backboards.
- B. General
  1. Backboard shall be 0.75 inch thick waterproof flame retardant plywood secured to structure.
  2. Each board shall be painted.
  3. Telephone backboards shall be normally 4 ft. x 8 ft. mounted 6 inches above floor where located on drawings. Where other sizes are required, they will be noted on the drawings.

- C. Each terminal cabinet for communication systems, relays, etc., shall be fitted with a full size 0.50 inch thick backboard for mounting terminal strips, equipment, etc.

END OF SECTION

**26 05 05 FIRESTOPPING**

**PART 1 - GENERAL**

- 1.1 Firestopping assemblies shall be provided at penetrations of conduits, bus ducts, cables, cable trays and other electrical items thru fire rated floors, fire rated floor-ceiling and roof ceiling assemblies, fire rated walls and partitions and fire rated shaft walls and partitions. In addition, firestopping assemblies shall be provided at penetrations thru 0-hour rated floors. Refer to the drawings for fire rated building elements.
- 1.2 Firestopping assemblies shall be tested and rated in accordance with ASTM E814, E119 and listed in accordance with UL 1479, as published in the UL Fire Resistance Directory. Firestopping shall provide a fire rating equal to that of the construction being penetrated.
- 1.3 Firestopping materials, assemblies and installation shall conform to requirements of the OBC Chapter 1, Section 106 and Chapter 7, Section 712 and the Authority Having Jurisdiction.
- 1.4 For those firestopping applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.5 Shop drawings shall be prepared and submitted for review and approval. Submittals shall include manufacturer's specifications and technical data of each material, documentation of U.L. firestopping assemblies and installation instructions. Submittals shall include all information required in OBC Chapter 1, Section 106 and Chapter 7, Section 712.

**PART 2 - PRODUCTS**

- 2.1 Firestopping materials shall be manufactured and/or supplied by Hilti, 3M, Rectorseal-Metacaulk, Tremco, Nelson, Specified Technologies or other approved manufacturer.
- 2.2 Materials shall be in the form of caulk, putty, sealant, intumescent material, wrap strip, fire blocking, ceramic wool and other materials required for the UL listed assemblies. These shall be installed in conjunction with sleeves and materials for fill and damming.
- 2.3 Combination pre-set floor sleeve and firestopping assemblies shall be equal to Hilti CP 680.

**PART 3 - EXECUTION**

- 3.1 Provide all firestopping for all work. Refer to Division 7.
- 3.2 Installation of all materials and assemblies shall be in accordance with UL assembly drawings and the manufacturer's instructions.
- 3.3 Installation shall be done by an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary training and experience.
- 3.4 Refer to 26 05 33 Raceway and Boxes for Electrical Systems for sleeve requirements and treatment of penetrations not requiring firestopping.

END OF SECTION



**26 05 19 A LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS**

**COPPER**

**PART 1 - GENERAL**

1.1 This section pertains to the use of copper conductors, 600V insulation class.

**PART 2 - PRODUCTS**

- 2.1 All conductors shall be copper: conductors shall be insulated for 600 volts.
- 2.2 Insulation types referenced are those of NEC. All conductors shall be UL labeled and shall be marked for size and type at regular intervals on its length. Conductors #8 and larger shall be stranded; #10 and smaller may be stranded provided approved terminations are used.
- 2.3 Types of conductor insulation for general use may be any of the following, subject to limitations listed, in addition to those in the NEC:
- A. Type THHN - restrictions - do not use for conductors in slab. Do not use in wet locations.
  - B. Type THWN - no restrictions.
  - C. Type XHHW - no restrictions.
- 2.4 Use shielded VFD cables for feeds from VFD to motor where conductor length is longer than 25 feet. VFD cable shall be 3 conductor XHHW low capacitance copper, full size insulated copper ground, 1.5 mil AL foil and 85 percent tinned copper woven braid shield with PVC oil and sunlight resistant jacket. UL TC-ER, 90 degrees C., 600V wet/dry. Manufactured by Belden, AWC, Lutze or equal.
- 2.5 Use Type THHN or XHHW, (90 degrees C. rated) types for running thru fixture housings.
- 2.6 Use conductors such as type FEP with high temperature insulation as identified in the NEC for connections to resistance heating elements or in other areas subject to temperature exceeding the rating of THWN, XHHW or THHN.
- 2.7 Color Coding – The use of colored commercial building wire is encouraged.
- A. On 208/120 volt, three phase and 240/120 volt, single phase grounded systems, wires colored black, red and blue shall be used for phase conductors. Neutral wires on these systems shall be white. If conductors No. 4 AWG or larger are not available in white or white stripes, the neutral may be a black wire identified with white tape, minimum size 0.50 inch wrapped twice around at the following points:
    - 1. At each terminal.
    - 2. At each conduit entrance.
    - 3. At intervals not more than 12 inches apart in all accessible enclosures.
  - B. On 480/277 volt, three phase system, wires colored brown, orange and yellow shall be used for phase conductors. Neutral wires on these systems shall be gray or other NEC acceptable means for distinguishing each system grounded conductor from another. If conductors No. 4 AWG or larger are not available in the proper colors, black wire may be used with 0.50 inch tape bands of the proper color at the following points:
    - 1. At each terminal.

2. At each conduit entrance.
  3. At intervals not more than 12 inches apart in all accessible enclosures.
- C. Neutrals for branch circuits controlled by AFCI circuit breakers shall have a colored stripe on white wire that matches the phase conductor color.
  - D. Equipment grounding conductors shall be green, or for 4 AWG and larger may be completely taped green, at all accessible points.
  - E. All control circuits shall be red with individual wire identification on each conductor.
  - F. Where existing wiring systems (remodel work or building additions) have different color coding, consult the Engineer concerning matching existing wire color coding and phasing.
- 2.8 Wire size ampacity shall equal or exceed its overload protective device. Where wire sizes shown on the drawings are greater than the apparent ampacity requirements, the size shown shall prevail to compensate for voltage drop. In no instance shall conductors be installed that are less than required by N.E.C. Minimum conductor size shall be No. 12 AWG except No. 14 AWG may be used only for control wiring or where otherwise specifically shown.
- 2.9 When necessary to use a lubricant for pulling wires, lubricant must be listed by Underwriters' Laboratories, Inc. Only cable lubricants approved for the type of jacket material or insulation shall be used, and must be of such consistency that it will dry completely when exposed to air. Lubricant must leave no obstruction or tackiness that will prevent pulling out old wires or pulling in new wires or additional wires, and, after drying, must leave a film of lubrication which will promote easy movement of the wires. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes. Lubricant shall be Ideal "Yellow 190", 3M "WL" Wire Pulling Lubricant, or approved equal.
- 2.10 Splices No. 10 AWG and smaller shall be made using the following:
- A. Preinsulated spring pressure connectors as follows: ITT Holub "Freespring", with metal grip threads 3M "Scotch-Lok", Ideal "Wingnut", Thomas and Betts Type "PT", or Buchanan "B Cap". Other hard insulated wire connectors which have bakelite or ceramic insulation are prohibited. (Non-metallic thread connectors shall not be used.)
- 2.11 Splices No. 8 AWG and larger shall be made using the following:
- A. Approved crimp type connectors with special crimping tool; T&B, Burndy, Buchanan or approved equal. Joints and free ends shall be covered with tape or approved moistureproof insulating kits. Applied insulation shall exceed 150 percent of conductor insulation voltage rating.
  - B. For two or more taps use Power Distribution Blocks by Square D, Gould, Taylor, IlSCO or Connectron.
- 2.12 Wiring in vertical raceways shall be supported with strain relief devices; Kellem's grips or approved equal.
- 2.13 Connections to equipment shall be made with pressure type terminals. On stranded wire, use spade type terminals or terminals approved for use with stranded wire. Connections shall contain only single conductors unless approved for multiples.

- A. For conductors No. 10 AWG and smaller, applied crimp type terminals shall be T&B "Sta Kon" or approved equal.
  - B. For No. 8 AWG and larger conductors, applied crimp type terminals shall be Burndy, T&B or approved equal.
- 2.14 Where tape is applied over wires and connectors on 600 volt or lower voltage applications, it shall consist of a minimum of two (2) half lapped layers of Scotch "88" or Plymouth No. 4240 for both indoor and outdoor applications, except Scotch 33 Plus or Plymouth No. 4453 is acceptable for use indoors.
- 2.15 Where fireproofing of cables is noted on the drawings or required by Code, each cable shall be arc and fireproofed with one (1) half lapped layer of Scotch Brand 77 Electric Arc and Fireproofing Tape. Tape shall be secured with a 2 layer band of Scotch Brand 69 Glass Electrical Tape over the last wrap. Installation shall comply with manufacturer's recommendation.
- 2.16 Where installed underground, splices and terminations shall be listed and approved for waterproof application. Utilize kits approved for the application.

### **PART 3 - EXECUTION**

- 3.1 All wiring, line and low voltage shall be installed in conduit. This includes all branch circuitry, lighting controls, hvac control wiring, etc.....
- 3.2 Branch circuit conductor identification means shall be permanently posted at each panelboard and switchboard. This identification shall be installed on the inside of the door and shall identify conductor colors for each voltage system in the building. Provide identification at all new panelboards and existing panelboards utilized within this project.
- 3.3 Conduit systems shall be clear and clean before pulling wire. Branch circuit conductors shall be pulled without resorting to levers or heavy pulling devices.
- 3.4 Cable pulling tensions shall not exceed recommended values.
- 3.5 Group ungrounded and grounded circuit conductors for each multiwire branch circuit by cable ties in panelboards and tap boxes.
- 3.6 Each branch circuit or multiwire branch circuit shall have its own dedicated neutral. Group neutral conductors with phase conductors by wire ties in each enclosure where multiple neutrals provided.
- 3.7 Shielded VFD cables shall be provided for VFD to motor conductors length longer than 25 feet. VFD motor feed cables shall be terminated per VFD manufacturer's direction.
- 3.8 Control conductors shall not be run in same raceway with branch circuit or motor circuit conductors.
- 3.9 Unless noted otherwise on the drawings, a maximum of 8 conductors shall be installed in a branch circuit conduit. This maximum is a count of all phase and neutral conductors only, ground conductors are not counted when determining maximum fill for this purpose.
- 3.10 Wire tags shall be provided on all main and feeder conductors in all pull boxes, wireways and panelboard and switchboard wiring gutters. Tags shall identify wire or cable number and/or equipment served. Tags shall be of flame resisting adhesive material, T&B Type WSL or approved equal.

- 3.11 Perform meggar tests on all feeders and motor branch circuit conductors prior to energization of circuits. Provide documentation in standard NETA format to the Engineer for review. Do not run meggar check on solid state equipment.

END OF SECTION





- 3.8 Equipment mounted on vibration isolation hanger and supports shall be bonded so bond does not transmit vibration. Size bond to match equipment ground conductor.
- 3.9 A green grounding conductor shall be installed in each non-metallic conduit and all flexible conduits, including exterior underground conduits.
- 3.10 System neutral connections shall be insulated from metal enclosures except at the neutral of the service entrance equipment and on the neutral of a separately derived system. Connections to the main switchgear enclosure shall be by means of bonding jumpers.
- 3.11 The building neutral shall be identified throughout with white conductors. Where there are neutral conductors from a separately derived system (such as 120/208 volt, 3 phase, 4 wire where the main building service is 277/480 volt, 3 phase, 4 wire) the neutrals of the two systems shall be separately identifiable per NEC Article 200.
- 3.12 Where metal covers on pull boxes and junction boxes are used, they shall comply with the grounding and bonding requirements of NEC Article 250.
- 3.13 Grounding Systems Tests
- A. Visual and Mechanical Inspection: Inspect ground system for compliance with plans and specifications.
    - 1. Electrical Tests
    - 2. Perform 3-point fall-of-potential test per IEEE Standard No. 81, Section 9.01 on the main grounding electrode of system.
    - 3. Perform the 2-point method test per IEEE No. 81, Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.
    - 4. Alternate Method to 2) above: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. This test shall be made by passing a minimum of ten amperes DC current between ground reference system and the ground point to be tested. Voltage drop shall be measured and resistant calculated by voltage drop method.
  - B. Test Values: The main ground electrode system resistance to ground should be no greater than five ohms.
  - C. Measure neutral-to-ground insulation resistance with neutral disconnect link temporarily removed. Report resistance level. Investigate and correct low resistance levels. Replace link before re-energizing system.
- 3.14 Provide sign at normal service "WARNING – SHOCK HAZARD EXISTS IF GROUNDING ELECTRODE CONDUCTOR OR BONDING JUMPER CONNECTION IN THIS EQUIPMENT IS REMOVED WHILE ALTERNATE SOURCE(S) IS ENERGIZED".

END OF SECTION

**26 05 28 COMMUNICATIONS SYSTEMS PATHWAYS AND SUPPORT EQUIPMENT**

**PART 1 - GENERAL**

1.1 Scope of Work

- A. Work consists of pathways to carry communication wiring of all descriptions, including empty conduits, conduit sleeves, basket tray, etc.
- B. Work includes support equipment for telecommunications cabling including backboards, rough-in boxes and cabinets.

1.2 Quality Assurance

- A. Communications pathways and support equipment shall be closely coordinated with other trades to provide adequate access, appropriate clearances and required separation between systems.

1.3 Shop Drawings – Submit shop drawings including product data sheets and diagrams per requirements including the following:

- A. A complete list of materials with model and part numbers and reference to the specification paragraph number.
- B. A complete set of detailed manufacturers specifications describing and illustrating all standard and special components and materials.
- C. A complete set of drawings of special items. Submit drawings of cable tray and accessories including clamps, brackets, hangar rods, splice plate connectors, expansion joint assemblies, and fittings, showing accurately scaled components. Submit manufacturers data including, but not limited to, types, materials, finishes, width, rung spacings, inside depths and radii. For side rails and rungs, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).
- D. Submittals that do not contain all this required information WILL BE REJECTED.

1.4 Drawings

- A. The drawings, which constitute a part of these bid documents, indicate the general route of the pathways to carry communication wiring systems. Data presented on these drawings are as accurate as preliminary surveys and planning can determine until final equipment selection is made. Accuracy is not guaranteed and field verification, of all dimensions, routing, etc., is directed.
- B. Specifications and drawings are for assistance and guidance, but exact routing, locations, distances and levels will be governed by actual field conditions. Contractor is directed to make field surveys as part of his work prior to submitting system layout drawings.

1.5 Related Work by Others

- A. Communications cabling shall be included as stated in the specification section for each individual system.

## PART 2 - PRODUCTS

### 2.1 Conduit Systems

- A. Refer to specification section 26 05 33 Raceway and Boxes for Electrical Systems.

### 2.2 Cable Tray (Wire Mesh / Basket – Steel)

- A. General: Provide wire basket of types and sizes indicated; with all necessary horizontal and vertical bends, closures, junctions, connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features.
- B. Materials and Finishes: Material and finish specifications for each wire basket type are as follows:
  - 1. Paint: Straight sections shall be painted Telco Gray over Yellow Zinc Dichromate.
  - 2. Pre-Galvanized Zinc: Wall brackets and other pre-galvanized accessories shall be coated with zinc in accordance with ASTM A653.
  - 3. Electro-Galvanized Zinc: Support accessories and miscellaneous hardware shall be coated in accordance with ASTM B633 SC3. All threaded components shall be coated in accordance with ASTM B633 SC1.
- C. All straight section longitudinal wires shall be straight (with no bends).
- D. Wire basket shall be made of high strength steel wires and formed into a standard 2-inch by 4-inch wire mesh pattern with intersecting wires welded together. All wire ends along wire basket sides (flanges) shall be rounded during manufacturing for safety of cables and installers.
- E. Wire basket sizes shall conform to the following nominal criteria:
  - 1. Straight sections shall be furnished in standard 9 or 10 foot lengths.
  - 2. Wire basket shall have a 4-inch usable loading depth by 12 inches wide with 12 inch radius.
- F. All fittings shall be field formed as needed.
- G. All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 stainless steel.
- H. Wire basket supports shall be center support hangers, trapeze hangers or wall brackets as provided by the manufacturer and as otherwise indicated on the drawings.
- I. Trapeze hangers or center support hangers shall be supported by minimum 3/8 inch diameter rods.
- J. Special accessories shall be furnished as required to protect, support and install a wire basket support system.
- K. Coordinate wire basket with other electrical work as necessary to properly interface installation of wire basket with other work.

- L. Provide sufficient space encompassing wire basket to permit access for installing and maintaining cables.
- M. Tray shall be manufactured by Eaton B-Line / Flextray, Cope "Cat-Tray", Mono Systems "Mono-Mesh", Chalfant "Versa-Tray", Legrand, Cablofil "EZ Tray", Husky or Niedax.

### 2.3 Rated Wall through Penetration

Fire-rated pathway shall contain built-in fire sealing system for installation in fire rated wall. The system shall automatically adjust to installed cable loading and shall permit cables to be installed, removed or retrofitted without the need to adjust, remove or reinstall firestop materials. The pathway shall be UL classified and tested to ASTM E81H (UL1479) requirements. Ez-Path Series 44 or equal.

### 2.4 Cabinets

- A. Telephone, communication and data systems cabinets shall be provided by the same manufacturer as panelboards with matching trim, hinges, latches, locks, finish and color unless included as part of another communication system specification. Refer to Section 26 24 16 "Panelboards" and Section 26 27 16 "Electrical Cabinets and Enclosures".

### 2.5 Backboards

- A. Refer to Section 26 05 04 – Basic Electrical Materials and Methods.

### 2.6 Rough-In Boxes

- A. Refer to Section 26 05 33 – Raceway and Boxes for Electrical Systems.
- B. Refer to drawings for types, quantities and configurations of outlet boxes used to serve communications cabling.

## **PART 3 - EXECUTION**

### 3.1 General Installation

- A. Refer to drawings for pathway types, locations and routing.
- B. Cable pathways shall provide the following minimum clearances:
  - 1. Motors and transformers – 4 ft.
  - 2. Conduit and cable used for electrical power distribution – 1 ft.
  - 3. Fluorescent lighting – 5 inches.
  - 4. Power lines up to 5 kV – 5 inches.
  - 5. Power lines over 5 kV. – 24 inches.
- C. Backboards and cabinets shall be installed in telecommunications rooms/spaces to support telecommunications equipment and wiring. Coordinate locations of backboards and cabinets with Architect prior to installation.
- D. Provide necessary pathways in areas that have exposed structure or plastered ceilings to provide a wiring path for cables from area above suspended ceilings to respective backboards.

- E. No non-metallic or combustible materials shall be installed in ceiling or other plenums used for circulating room air used for heating, ventilation or cooling.

### 3.2 Conduit Systems

- A. No section of conduit shall be longer than 100 feet between pulling points.
- B. No more than two 90 deg. bends in a section of conduit between pulling points.
- C. Each section of conduit shall be labeled for length, destination closet and origination closet.
- D. Refer to EIA/TIA 569-A for specific conduit and pull box requirements.
- E. Conduit and wiring above accessible ceilings shall be run as high as possible, above piping and ductwork, so as to not interfere with mechanical trades, access to mechanical and electrical devices and to allow freedom to remove ceiling panels.
- F. Provide a No. 12 gauge pull wire or nylon pull cord in each empty conduit run.

### 3.3 Wireways

- A. Wireways shall be supported with factory made hangers designed expressly for this purpose and 0.375 inches diameter solid hanger rods approximately 5 ft. on center or approved strap hangers for surface mounting.
- B. Provide wire basket cable tray of types and sizes indicated; with all necessary horizontal and vertical bends, closures, junctions, connector assemblies, clamp assemblies, connector plates, splice plates and splice bars.

### 3.4 Cable Tray

- A. Furnish all necessary horizontal and vertical bends, closures, junctions, devices, etc. normally recommended by the manufacturer and install same in strict accordance with their recommendations.
- B. "Ladder Type" cable trays shall be supported from continuous wall inserts and shelf brackets in a manner to permit laying cables in the trays without interference of a supporting rod on one side. All inserts, supports and necessary wall modifications and bracing shall be furnished by this Contractor.
- C. "Center Hung Type" and "Wire Basket Type" cable tray shall be supported from continuous overhead center rods or hangers compatible with the building structure and cable tray furnished and in accordance with manufacturers recommendations. Where cable tray is wall supported it shall be continuous with wall inserts and shelf brackets. Cable tray shall be installed to allow laying cables in both sides of tray without interference. All inserts, supports and necessary wall modifications and bracing shall be furnished by this Contractor. Coordinate with the Architect and General Contractor and provide all required structural and wall modifications.

### 3.5 Rated Wall through Penetration

Where cable path is to penetrate fire rated walls a fire sealing system is to be installed. Provide multiple units equal to width of cable tray using a multi-gang kit.

### 3.6 Grounding

- D. The main telecommunications wiring closet (TC-01) shall be provided with the Main Telecommunications Ground Bar (MTGB). The MTGB shall be bonded to the building main electrical system ground and shall be bonded to one additional building electrical system ground (such as building steel). Each Telecommunications Closet (TC) shall be provided with a Telecommunications Ground Bar (TGB).
- E. Provide a Telecommunications Bonding Backbone (TBB) consisting of a #6 AWG conductor (unless otherwise indicated on drawings) in 0.75 inches schedule 40 PVC conduit from the MTGB to each TGB.
- F. All grounding and bonding shall be in conformance with the National Electric Code and as recommended by EIA/TIA-607.
- G. Bond all communications conduits, wireways, cable tray, conduit stubs and sleeves, etc. to the electrical / building grounding system. Ground cable tray to the ground bus and bond each joint with bonding jumpers for an absolute ground. All metallic conduit stubs to the cable tray for telephone, data, power or even empty conduits for future use shall be bonded to the cable tray to ensure ground continuity between the different raceway systems.
- H. Provide means of bonding each joint for absolute grounding of the cable tray and ladder rack.

### 3.7 Cabinets

- A. Mount top of wall mounted cabinets 6 ft.-0 inches above floor. Coordinate location of recessed cabinets to be accessible and to avoid interference with other equipment and trades.
- B. Each cabinet shall be fitted with a full size 0.75 inches thick backboard for mounting terminal strips, equipment, etc.

### 3.8 Identification / Labeling

- A. All continuous communications pathways such as conduit, cable tray, etc. shall be labeled to indicate origination and destination. Label shall be applied every 50 ft. wherever accessible or subject to administration. Coordinate label information with Owner.
- B. Label shall consist of mechanically printed, permanent adhesive label, applied to cleaned / prepped area of raceway.

### 3.9 As-Built Documentation

- A. Provide a complete set of architectural floor plan drawings indicating final communications pathway systems with accurate "as-built" locations to show the actual route for the communications systems pathways.
- B. Drawings shall indicate each pathway type and provide sizing information such as conduit/innerduct diameter, cable tray width, cable management ring size, etc.
- C. Component Service Manuals: Include information for testing, repair, troubleshooting, assembly, disassembly, and required / recommended maintenance intervals for all types of pathways.

- 3.10 Restore fire rating and smoke stoppage integrity where all wireways, raceways and cable trays pierce walls, floors and ceilings by sealing with approved means; refer to Raceway and Boxes for Electrical Systems Section 26 05 33 and Firestopping 26 05 05.

END OF SECTION



**26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

- 1.1 This specification section covers common conduit systems, boxes, firestopping and sleeves. Where other methods are specified under separate sections for specific applications, the specific application requirements shall govern.
- 1.2 Refer to Section 26 05 05 Firestopping and Division 07 for firestopping requirements.
- 1.3 Refer to Section "Communication System Pathways and Support Equipment" for future communication system.

**PART 2 - PRODUCTS**

- 2.1 Conduit Type - Application (Use only conduit types listed)
  - A. Conduit - Rigid or Intermediate Grade Galvanized Threaded.  
Application - restrictions - (Not to be used in):
    1. Direct buried in corrosive soils.
    2. Corrosive atmospheres.
  - B. Conduit - Rigid Aluminum threaded.  
Application - restrictions - (Not to be used in):
    1. Underground.
    2. Corrosive atmospheres.
    3. In concrete.
  - C. Conduit - Thinwall EMT.  
Application - restrictions - (Not to be used in):
    1. Poured concrete.
    2. Exposed to weather.
    3. Underground.
    4. Exposed in mechanical equipment or other equipment/process rooms below 48 inches.
    5. Hazardous or corrosive atmospheres.
    6. Not to be used for medium voltage (2001 volts or higher) cable.
    7. Not to be used in utility tunnels.
  - D. Conduit - PVC Type 40 (Schedule 40) rigid, conforming to ANSI, NEMA specifications and each length UL labeled.  
Application - use limited to:
    1. In or under concrete slabs on grade where permitted by electric legend on the drawings.
    2. Exterior use when encased in 3 inch concrete.
    3. Direct buried, underground when indicated on drawings.
  - E. Conduit - PVC, NEMA Type TC 6, rigid, conforming to ANSI, NEMA specifications and each length UL labeled.  
Application - use limited to:
    1. Exterior use when encased in 3 inch concrete, for duct bank use only.

- F. Conduit - Flexible Metal (Greenfield type), galvanized steel or aluminum type "MC".  
Application - use limited to:
1. Connection to lighting fixtures; not over 6 ft. in length. Note: Metal-Clad Cable: Type MC may be used for fixture whips only; must contain green insulated ground conductor, be limited to 6 ft. in length and must use UL approved connectors. Other applications are not acceptable.
- G. Conduit - Liquidtight Flexible Metal.  
Application - use and limitations:
1. Connections to all motors, except in air stream or plenum.
  2. Connections to controls on dynamic equipment, transformers, etc., outdoors and indoors in wet locations.
  3. Use not permitted underground or where subject to physical damage.

## 2.2 Conduit sizes

- A. Conduits shall be 0.75 inch minimum size including switch legs; no exceptions.
- B. Conduits for all low voltage systems such as network, CCTV and voice shall be 1" minimum size; no exceptions.

## 2.3 Conduit Fittings

- A. Fittings and workmanship shall ensure electrical continuity. All conduit systems in poured concrete shall be concrete tight.
- B. Application of bushings, locknuts and insulated fittings shall comply with NEC requirements.
- C. Use conduit fittings as manufactured by Efcor, Steel City, Raco, Midwest, Appleton, ETP / O-Z / Gedney, American Fitting Corporation or T&B, equal to the following catalog numbers:
1. Rigid and intermediate conduit
    - all fittings, couplings and connectors shall be threaded type.
    - grounding bushings, malleable iron; insulated; Steel City BG-801; Midwest Series GLL.
  2. EMT
    - fittings shall be all steel, set screw or compression type, concrete tight.
    - set-screw type couplings; Midwest Series 460; Steel City TK 121; Appleton TW 50S.
    - compression type couplings; Midwest series 660S; Steel City TK111; Appleton TWC50CS.
    - set-screw type connectors; Midwest Series 450; Steel City TC 121; Appleton TWC 50S.
    - compression type connectors; Midwest Series 650; Steel City TC111; Appleton TW50CS.
  3. Flexible metal conduit
    - malleable iron, "squeeze" type, non-insulated; Midwest series 1708; Steel City XC 901; Appleton 7481V. (For lighting fixture whips only - all steel or die cast screw in connector; Midwest 771; Steel City XC 241; Appleton SGC 50DC).
  4. Liquid tight conduit

- steel or malleable iron; Midwest Series LT; Steel City LT 100; Appleton ST.
- 5. PVC Type 40 and Type TC-6
  - couplings and fittings socket type solvent weld, coupling and solvent by same manufacturer as conduit.
- 6. RTRC
  - Coupling and fittings socket type adhesive jointing. Coupling and adhesive by same manufacturer as conduit. Gasketed jointing system may be used underground where encased in conduit.

#### 2.4 Boxes

- A. Junction boxes and pull boxes shall be code gauge galvanized steel with multiple screw fasteners and galvanized steel covers.
- B. Outlet boxes all steel construction with galvanized or plated finish or otherwise all metal, by Steel City, Appleton, Crouse Hinds, R&S or Raco.
  - 1. Lighting fixture outlet boxes 4 inches square or octagonal, 2.125 inches deep, with 0.375 inch fixture studs. Equal to Steel City Series 54171; Series 52171 with FE 421 stud. Fixtures weighing more than 50 lbs. shall be supported independently of the outlet box.
  - 2. Flush mounted device outlet boxes shall be minimum 4 inches square. Provide extension rings as required. Use Erico Caddy No. H2-3 mounting support plate where metal studs are used.
  - 3. Device rings in finished masonry or tile walls shall be square corner masonry type with no extended ears, to allow flush mounting of plates.
  - 4. Surface mounted device boxes shall be cast "FS" type or special surface mounted boxes for use with surface raceway systems.
- C. Floor boxes shall be UL listed for its application as manufactured by Hubbell, Steel City, Walker, Raco or Wiremold. Drawings identify material type.
- D. Provide water tight boxes, slip expansions and bonding jumpers where dictated by construction conditions.
- E. Terminations at boxes shall be secured by locknuts or approved bushings.

#### 2.5 Surface Metal Raceways

- A. Snap on cover types by Wiremold with prime gray finish (enamel finish coat to match room finishes in remodel areas). Application - permitted only when specifically shown on the drawings.
  - 1. All wiring and conduit shall be installed concealed above all lay-in ceiling systems. Where wiring is required to be run exposed along walls and ceilings, it shall be run in metal surface raceway (Wiremold #2100 unless indicated otherwise – or equal) mounted tight to existing surface matching contour of building lines and painted to match surfaces on which they are mounted. Coordinate all locations and routes with Engineer prior to rough-in. Surface mount raceway is only acceptable where existing walls cannot be fished for conduit to be concealed.
  - 2. Fittings, boxes and extension rings: Furnish manufacturer's standard accessories; match finish of raceway.

## 2.6 Sleeves and Openings

- A. Sleeves and formed openings shall be placed in walls, partitions, floor slabs and poured concrete roof decks for the passage of conduit, cable, wireway, cable tray and bus duct. Sleeves and formed openings are not required:
1. In floor slabs on grade.
  2. Where conduit is installed before the wall, partition or slab is constructed.
  3. Openings are cut for conduit passage and patched with equal or comparable material to close the space around the conduit.
  4. In stud and gypsum board or plaster walls and partitions which are not fire rated.
  5. For conduit passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions. Sleeves are required however, for which expansion, contraction and other movement can be expected.
  6. In core drilled openings in solid concrete not requiring water protection. Sleeves are required, however, at core drilling thru hollow pre-cast slabs and concrete block walls, to facilitate containment of required firestopping material.
  7. In large floor openings for multiple pipe and duct risers which are within a fire rated shaft, unless the opening is to be closed off with concrete or other material after conduits are set.
  8. Sleeves for passage of conduit and cables shall be schedule 40 black steel pipe or galvanized rigid conduit. Rectangular sleeves for cables, wireway, cable tray and bus duct shall be 18 gauge galvanized steel in poured concrete floors, walls and roof decks; 26 gauge galvanized sheet steel in other than poured concrete.
  9. Sleeves shall be sized to afford 0.25 inch to 0.75 inch clearance space.

2.7 In areas having special membrane waterproofing in or on the floor slab, a Josam 26420, or equal approved by the Architect, riser sleeve with clamping ring and auxiliary conduit sleeve extending 4 inches above finished floor or 8 inches above finished roof shall be used. Waterproofing membrane for roof and floor construction shall be secured by the clamping ring. These are to be used in areas having special membrane water-proofing in or on the floor slab and at roof decks.

2.8 Multiple conduits extending through the roof may be fitted with a manufactured pipe curb weatherproofing assembly equal to Pate # pca, lpca and mpca as an alternative to that specified in paragraph 2.7 above.

2.9 Escutcheon plates shall be split-ring chromium plated pressed steel. Plates shall be sized to cover the surface penetration and sleeve. Plates shall be installed on exposed piping in finished rooms and areas where conduits penetrate walls, floors, ceilings or overhead structure.

## 2.10 Anchors and Fasteners

- A. Anchors and fasteners shall be of a type designed and intended for use in the base material to which the material support is to be attached and shall be capable of supporting the intended load and withstanding any associated stresses and vibrations.
- B. In general, screws shall be used in wood, masonry anchors on concrete or brick, toggle bolts in hollow walls, and machine screws, bolts or welded studs on steel.
- C. Nails shall not be used except for temporary support or for light loads in wood frame construction.
- D. In outdoor locations or other corrosive atmospheres, the anchors and fasteners shall be non-corrosive or have suitable corrosion resisting coatings.

### **PART 3 - EXECUTION**

- 3.1 Conduit shall be run concealed in all finished areas of new construction and elsewhere unless specifically indicated or upon specific permission by the Architect. All conduit shall parallel building lines.
- 3.2 Conduit shall be run overhead and shall not be run in or below concrete slabs unless specifically indicated on the drawings and in the legend on the drawings.
- 3.3 Where feeders are permitted to be run below floor slab on grade, they shall be installed in non-metallic conduit encased in 3 inch concrete using galvanized rigid steel or RTRC (equal to Champion Fiberglass) elbows with all necessary fittings and couplers. (NOTE: Where not required to be run overhead, branch circuits may be installed in 1 inch or smaller Schedule 40 PVC conduit below the vapor barrier, shall have a minimum of 6-inch fill over the conduit below the vapor barrier without concrete encasing the PVC. The 90 degree elbow and stub up shall be galvanized rigid steel).
- 3.4 All conduits installed below concrete slab on grade shall have a minimum of 6-inches fill over the conduits in order to prevent accidental damage to conduits should the floor be saw-cut in the future.
- 3.5 Conduits shall not be installed above the vapor barrier in concrete floors poured on grade.
- 3.6 Conduit crossing building expansion joints shall have expansion provisions with grounding continuity; use special expansion fittings or other NEC approved method. Refer to the Architectural and Structural floor plans and details for locations of expansion joints.
- 3.7 Do not install wall-mounted boxes back-to-back in opposite sides of wall; in stud walls, boxes shall be on opposite side of studs. In acoustic rated and fire rated walls boxes shall be separated a minimum of 24 inches.
- 3.8 Boxes not otherwise accessible in ceilings and walls shall be made accessible by installation of hinged door access panels. Refer to Section 26 05 04 - Basic Electrical Materials and Methods.
- 3.9 Use cast floor boxes for installation in slab on grade; formed steel boxes are acceptable for other installations.
- 3.10 Work shall be so planned as to:
  - A. Minimize the number of offsets and junction boxes. For feeder conduits, use all long radius conduit bends or accessibly located large junction boxes with screw covers.
  - B. Generally run conduit and conductors as high as practicable against underside of floor slab in concrete construction or immediately below the top chord of bar joist construction unless otherwise shown. This high level zone shall be used for running electrical raceways. Running conduits promiscuously at various levels and directions will not be acceptable. Runs at bottom chord level or ceiling grid level will not be acceptable.
  - C. Where spray on fireproofing is used, coordinate with the General Contractor about installing supports, panel feeders and larger conduits before fireproofing is applied. Branch circuit conduits and smaller size conduits may be run as high as possible on stud walls that go all the way up to the structure; this will minimize damage to spray on fireproofing. Patch and repair damaged spray on fireproofing caused by electrical installation; conduits shall not be fully covered with fireproofing.

- D. Coordinate activity in advance to avoid interference with other trades.
  - E. Provide access to all junction and pull boxes.
  - F. Maintain 6 inches from conduit to paralleled hot water piping and 4 inches from cross piping and 12 inches from generator exhaust piping.
- 3.11 Secure feeder conduit to basic structural elements with galvanized strap hangers and clamps; use of trapeze type hangers is encouraged for multiple conduits where space will permit. Galvanized metal clamps and screws may be used for attaching and supporting branch circuit conduit. Non-metallic fasteners shall not be used except plastic inserts may be used in concrete for small conduits. Vertical conduits shall be supported at each floor by clamps.
- 3.12 Surface mounted horizontal and vertical conduit supports on walls up to a height of 7 feet-0 inches above the floor shall be one or two hole sheet metal pipe straps. Pinch type hangers similar to Minerallac type may only be used at heights greater than 8 feet-0 inches. The use of pinch type hangers similar to Minerallac type are expressly prohibited on ductwork, air handling units and other mechanical equipment below 8 feet-0 inches.
- 3.13 During construction temporarily cap open ends of conduit. Caution trades to take special care of runs in concrete slabs during pouring.
- 3.14 Empty conduit installed for communications use or for future systems shall have an insulated pull wire or heavy nylon cord inserted for use in pulling wires.
- 3.15 Pull mandrel or large swab thru conduit to ensure freedom from debris before pulling wires. Use pulling lubricants sparingly.
- 3.16 Sleeves for passage of conduit, cables, wireway, cable tray and bus duct shall be placed in the initial stages of construction before concrete, masonry and other general construction activity. Means shall be taken to ensure that the sleeve will not move during or after construction. Beams, columns and other structural members shall not be sleeved except upon approval of the Architect.
- 3.17 Length of wall sleeves shall be such that the sleeve ends are substantially flush with both sides of the wall or partition. Floor sleeves shall be flush with the bottom and top of the floor slab except, in mechanical rooms and other areas which might have water on the floor, sleeves shall project a minimum of 1 inch above finished floor. Refer to the following paragraph for qualifications and exceptions relating to firestopping.
- 3.18 Refer to 26 05 05 Firestopping. Sleeves which are a part of firestopping assemblies shall conform to the requirements of the assembly with particular emphasis regarding size, annular space, length, passage or non-passage of insulation and the installation of the sleeves.
- 3.19 Where firestopping is not required, the annular space between the sleeve, core drilling or opening and the conduit, cable, cable tray, bus duct and raceway shall be closed with caulking to retard the passage of smoke.
- 3.20 Where permitted by OBC Section 712 Penetrations, metallic conduits requiring no pipe sleeves in passing thru concrete floors or concrete or masonry walls and partitions, the annular space shall be closed full depth of the penetration with materials and methods compatible with the floor, wall or partition material (concrete, grout or mortar).
- 3.21 Openings for multiple conduits extending through floors where water protection is required (mechanical rooms, kitchens, other potentially wet areas) may be protected with a 4 inch high by 4

inch wide concrete curb with chamfered corners in lieu of individual sleeves. These concrete curbs may be used in lieu of the Josam 26420 riser sleeve and clamping ring provided the floor membrane and curbing are arranged to maintain the integrity of the membrane.

- 3.22 Conduits, wire and cables entering from outside the building shall be sealed water and moisture tight. Seal between conduit and sleeves, conduits and core drilled holes and around conductors inside conduits. Provide cast iron pipe or schedule 40 galvanized steel conduit sleeves in exterior walls below grade, with intermediate wall stop and anchor collar set in place before concrete pouring. Sleeve shall be a part of the sealing assembly. When the wall opening is core drilled the wall sleeve may be omitted. A mechanically compressed rubber sealing assembly equal to Thunderline Corp. "Link-Seal" shall be placed in the annular space between conduit and sleeve or core drilling.
- 3.23 Conduits extending through the roof shall be made watertight by means compatible with the roofing system and as directed by the Roofing Contractor (the company who presently holds the warranty on the roof) and approved by the Architect.
- 3.24 Conduit, wire and cable, where exposed to different temperatures, shall have raceway or sleeve filled with approved material to prevent circulation of warm air to cold.
- 3.25 Power actuated fasteners of any type are prohibited in occupied buildings. This includes anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant.
- 3.26 Provide four (4) 1 inch diameter spare conduits for each flush mounted branch circuit panelboard; extend from top of panelboard to above an accessible ceiling for future use.
- 3.27 All conduit terminations to be equipped with locknuts and bushings. Conduits 1-1/2 inches and larger shall have insulating bushings, grounding lug and shall have locknuts inside and outside the enclosure.
- 3.28 Outlet Box Installation
  - A. Set box square and true with finished building surfaces and trim.
  - B. Secure boxes firmly to building structure.
  - C. Verify location of outlets and switches in finished rooms with Architectural Drawings of interior details and finish. In centering outlets and locating boxes, allow for overhead pipes, ducts and mechanical equipment, variations in fireproofing and plastering, window and like, and correct any inaccuracy from failure to do so without expense to the Owner.
  - D. Maintain symmetry of all outlets as closely as possible contained within Architectural Elevation. For example, the Contractor shall center light fixture over doorway or receptacle in section of masonry wall, if shown in that approximate position. If receptacle is shown in same location as counter or bench, determine countertop height and set receptacle to clear top and trim of counter and render outlet easily accessible.
  - E. In the event of conflict between locations of electrical outlets as shown on the Electrical Drawings and on the Architectural Drawings, outlets shall be installed in accordance with the latter.
  - F. Locate light switches on latch side of door and verify door hinge location in field prior to switch outlet installation.

- G. The Owner reserves the right to relocate any device as much as 10 feet-0 inches (measured horizontally) from its indicated location at no additional cost, provided the contractor is notified prior to roughing that device in.
- 3.29 Contractor shall record carefully on a set of "as built" prints the exact location of all feeder conduits.
- 3.30 Unless noted otherwise on the drawings, a maximum of 8 conductors shall be installed in a branch circuit conduit. This maximum is a count of all phase and neutral conductors only - ground conductors are not counted when determining maximum fill for this purpose.

END OF SECTION



**26 05 36 SPECIAL WIREWAYS AND RACEWAYS – FOR ELECTRICAL SYSTEMS**

**PART 1 - GENERAL**

- 1.1 Work includes special wireway and raceway systems for power and branch circuit wiring and shall conform to requirements of NEC and all components and systems shall be UL listed.
- 1.2 Quality Assurance
  - A. Pathways for special wireways and raceways shall be closely coordinated with other trades to provide adequate access, appropriate clearances, required separation between systems, etc.
- 1.3 Shop Drawings – Submit shop drawings including product data sheets and diagrams per requirements including the following:
  - A. A complete list of materials with model and part numbers and reference to the specification paragraph number.
  - B. A complete set of detailed manufacturers specifications describing and illustrating all standard and special components and materials.
  - C. A complete set of drawings of special items. Submit drawings of wireways, duct systems and cable trays and all accessories including clamps, brackets, hangar rods, splice plate connectors, expansion joint assemblies and fittings, showing accurately scaled components. Submit manufacturers data including, but not limited to types of materials, finishes, width, depth, rung spacing, inside depths and radii.
- 1.4 Drawings
  - A. The drawings, which constitute a part of these bid documents, indicate the general route of the wireway and raceway systems. Data presented on these drawings are as accurate as preliminary surveys and planning can determine until final equipment selection is made. Accuracy is not guaranteed and field verification of all dimensions, routing, etc., is required.
  - B. Specifications and drawings are for assistance and guidance, but exact routing, locations, distances and levels will be governed by actual field conditions. Contractor is directed to make field surveys as part of his work prior to submitting system layout drawings.

**PART 2 - PRODUCTS**

- 2.1 Wireways
  - A. Wireways shall be metal trough with a removable hinged cover and generous knockout arrangement. Provide necessary ells, tees and fittings for a complete installation. All components shall be hot dip galvanized after fabrication or provided with a rust inhibiting phosphatizing coating and finished in baked enamel. All hardware shall be plated to prevent corrosion. Wireways shall be manufactured by Square D, Weigman, Hoffman, Austin; Eaton or Milbank.

**PART 3 - EXECUTION**

- 3.1 Ground cable tray to the ground bus and bond each joint with bonding jumpers for an absolute ground. All metallic conduit stubs to the cable tray for telephone, data, power, or even empty

conduits for future use shall be bonded to the cable tray to ensure ground continuity between the different raceway systems.

- 3.2 Openings through floors where water protection is required (mechanical rooms, kitchen, etc.) shall be protected with a 4-inch high by 4 inch wide concrete curb with chamfered corners.
- 3.3 Restore fire rating and smoke stoppage integrity where all wireways, raceways and cable trays pierce walls, floors and ceilings by sealing with approved means; refer to Section 26 05 33 "Raceways and Boxes for Electrical Systems".

END OF SECTION

## 26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 Equipment Identification

- A. Identify all the following items with laminated plates:
  - 1. Every motor, lighting and equipment controller and disconnect switch.
  - 2. Panelboards.
  - 3. Motor controllers and individual motor starters within panelboards.
- B. Nameplate on motor controllers, disconnect switches, and panelboards shall indicate source, voltage disconnect location, and load served.
- C. Equipment on the emergency systems shall be identified with nameplates having a red background. Outlets on the emergency systems shall be identified red. This shall be accomplished by using red devices or by providing a coverplate with "EMERGENCY" engraved on the face; fill engraving with red paint or equal.
- D. Branch circuit panelboards:
  - 1. Identify panel designation on directory card within the panel.
  - 2. Fill out branch circuit directory indicating circuit number and area served, rooms, group of rooms, lighting, convenience outlets, motors, etc. Card index shall be neatly typed. Provide electronic file for card using Excel.
  - 3. Update or replace branch circuit directory in existing panelboards in areas of alteration.
  - 4. Branch circuit phase conductor color format shall be permanently identified inside each panelboard.
- E. Conduit and junction boxes:
  - 1. Color code or label all junction boxes and exposed conduit at 20 ft. intervals. Coding shall be painted or labels of the pre manufactured type permanently mounted with metal or plastic band.
  - 2. Provide a color identification scheme under heavy plastic cover hanging in the electrical rooms; identification shall be:
    - a. Emergency - Orange
    - b. Normal - Black
    - c. Fire Alarm - Red
    - d. Sound - Blue
    - e. Telephone - Yellow
- F. Wire identification:
  - 1. Identify communications and signaling system wiring and branch circuit wiring by circuit number in panels and motor control center wiring gutters by means of permanent durable wire markers wrapped around or fastened to conductors. This shall be done concurrently with pulling of conductors.
  - 2. Wiring or fiber cabling installed by Contractor for termination by Owner's vendor such as for telephone or data systems shall be identified at both ends utilizing the alpha/numerical identification schedule established by the system vendor.

- G. For disconnecting means where power can be backfed (like tie breaker) provide permanent sign at disconnecting means saying: 'DANGER – CONTACTS ON EITHER SIDE OF THIS DEVICE MAY BE ENERGIZED BY BACKFEED.' Also, provide a single-line showing local switching arrangement on permanent sign.

## **PART 2 - PRODUCTS**

### 2.1 Nameplates

- A. Nameplates shall be laminated phenolic with black surface (red surface for emergency) and white core. Use 0.0625 inch thick material for plates up to 2 inches x 4 inches and 0.125 inch thick for larger sizes. The lettering shall be Condensed Gothic with space between the lines equal to the width of the letters. Use 0.25 inch minimum height letters on the small plates increasing the size proportionately to plate size.
- B. The lettering on the plate shall indicate the name of equipment, the specific unit number, voltage, phases, which panel, switchboard or motor control center the equipment is served from, and any other reference data pertinent to the operation. Names and numbers shall coincide with those listed on the drawings. Sample: Panel 3A; 277/480 V, 3 phase, 4 wire, served from unit substation USI.

## **PART 3 - EXECUTION**

- 3.1 Nameplates shall be secured with screws, one on each end.

END OF SECTION

## **26 05 65        SPECIFIC WIRING APPLICATIONS**

### **PART 1 - GENERAL**

1.1 Specific wiring applications are identified. Refer to applicable sections of the specifications.

### **PART 2 - PRODUCTS**

2.1 Materials and equipment shall be as indicated on the drawings and in the specifications.

### **PART 3 - EXECUTION**

3.1 Final connections to fixture pigtails shall be made with approved pressure connectors such as 3M "Scotchlok".

3.2 Miscellaneous Equipment Connections

A. Various items of equipment such as table power, etc. will be furnished and set in place by other trades. This equipment, unless otherwise shown on the drawings, will be furnished with necessary electrical outlets, operating and control switches, terminating in an electrical outlet box, or equivalent electrical connector located on the equipment. This Contractor shall furnish power wiring to these various items of equipment and connect them up complete and ready for operation. Devices to serve this equipment will be shown but the EC shall verify with E.S. that each connection is correct prior to rough-in.

B. Where disconnect switches are indicated or where otherwise required, these shall be mounted in an accessible location; but in the case of finished areas, in an inconspicuous a place as possible. Under counter installation of disconnect switches is preferred to locations above the counter, however, care shall be taken that such switches will be accessible and do not interfere with installation of the equipment.

C. Roughing in drawings for equipment shall be obtained from the Architect as the time approaches when such equipment is required. (Allow a reasonable period from the time of notice to secure this information.)

D. Where necessary to expose conduit in laboratories, rigid aluminum conduit and LB fittings shall be used.

3.3 Miscellaneous Wiring and Interlocks

A. Various items of work in connection with interlocking motor and starter operations and providing wiring to serve equipment which is furnished by other trades.

B. Interlocks between motor controllers for purposes of accomplishing sequence control or simultaneous operation of motors are all to be included by the Contractor. Requirements for a simple simultaneous motor operation interlock are indicated by a schedule on the drawings. These interlocks consist of auxiliary contacts on the starter of the lead motor wired in, according to standard diagrams of the motor starter manufacturer to energize the holding coil of the starter for the motor. These interlocks shall be thru the "automatic" position only of the starter where HOA switches are supplied. Where interlocks, other than the simple sequence above are required, these shall be as described hereinafter. This Contractor shall inquire of the Engineer during bidding, or at the earliest practical date, regarding any questions which may arise regarding the intention and scope of this work. This Contractor shall furnish extra

contacts for his starters where required, in lieu of which he may furnish externally mounted relays to accomplish the specified function.

- C. Air handling unit motors shall lead and exhaust fans and moving media air filters follow. Chiller pumps shall lead, followed by chiller, condenser pump and cooling tower, in that order. Condenser pumps shall lead and chemical feeder shall follow. Hot water pumps shall lead and boilers follow.
- D. The following is a list of equipment and systems requiring wiring. Note that these are in addition to standard interlocks which are scheduled on the drawings.
  - 1. Refer to the Fire Alarm Specification 28 31 00 for Smoke Damper Operation Requirements.
  - 2. Exterior lighting control shall be part of the new lighting automation system; refer to spec Section 26 57 14.
  - 3. Motorized backdraft dampers on exhaust fans and power roof ventilators shall be connected up to their respective associated motor leads to energize the backdraft damper motor and open the damper when the fan operates. Dampers, operator and transformer if required, will be furnished by the fan supplier. Where the motors are fed from a variable frequency drive controller (VFD) provide a separate branch circuit to serve the dampers from the nearest panelboard (normal or emergency use same type of source as the associated fan motor) with control through the VFD damper control output relay. Coordinate requirements with the VFD Supplier.
  - 4. Alarm bell and high limit float switch for the deaerator will be furnished by the Division 23. These shall be accepted, mounted and wired, including providing a 120 volt source of current, by the Contractor.
  - 5. Alarm bell for sewage pumps or bilge pumps shall be installed and wired at a location remote from the pumps. Transformer and bell are furnished by the pump supplier.
  - 6. Boiler recirculating pump starters shall be equipped with an auxiliary contact to accommodate an interlock between the boiler and the pump. Wiring on this control shall be by this Contractor.
  - 7. Power supply for heat tapes shall be provided as indicated on the drawings. Heat tapes are furnished under Division 23. Coordinate with Division 23 for detailed location and method of connection; provide ground fault protection of equipment per NEC Article 427.
  - 8. Independently mounted controllers, furnished by others: where starters are furnished by other trades, and are required to be mounted remote from the motor, this Contractor shall accept and mount them and perform all power and control wiring between controls and motors as indicated. Motor controllers equipped with automatic alternators shall have two independent circuits and control sources to preclude loss of operation when one circuit fails.
  - 9. High Water Alarm. Furnish a floor water alarm switch where shown and wire up through a 4 inch diameter alarm bell. Switch shall be "Water Alert" by Dorlen Products.

END OF SECTION

**26 09 23 LIGHTING CONTROL DEVICES**

**PART 1 - GENERAL**

- 1.1 Lighting control devices are identified on the drawings per legend symbols or as specifically noted. Catalog numbers from acceptable manufacturers for the common wiring devices shall be as listed herein. Catalog numbers are not listed for all devices. Other devices, such as key switches, clock hanger outlets, etc. shall be furnished by one of the manufacturers listed and shall be equal in quality to the device series listed.
- 1.2 When shop drawings are required for wiring devices the submittal shall be comprehensive for all wiring device configurations listed in the legend and for devices specifically noted on the drawings, including wall box dimmers, occupancy sensors and load control relays.

**PART 2 - PRODUCTS**

- 2.1 Toggle type AC switches shall be listed by Underwriters Laboratories, Inc. Switches shall be 20 ampere, 120/277 volt AC and ivory in color unless noted otherwise.

Acceptable Manufacturer	General Purpose	Red Pilot Lighted	Illuminated Handle	Momentary
Cooper	1221-I series	1991 PL series	1991 IL series	1995 series
Bryant	4901-I series	4901 PL series	4901 GLI series	4921 series
Hubbell	HBL1221-I series	HBL1221 PL series	HBL1221 IL series	HBL1557 series
Leviton	1221-2I series	1221 PL series	1221 LH series	1257 series
P&S	20AC1-I series	20AC1 RPL series	20AC1 ISL series	

- 2.2 Ceiling Mount Occupancy Sensor
  - A. Sensor shall be dual technology to detect human presence in controlled area by ultrasound and passive infrared. Dual sensing with both technologies must occur to activate lighting system. Sensor to be fully adaptive with self-adjusting and self-calibration.
  - B. Sensor shall have signal processing to respond to only those signals caused by human motion. Sensor to operate instantly for room motion and time off delay adjustable for 5 – 30 minutes. Sensor to be equipped with a walk-thru mode.
  - C. Sensor area coverage to be minimum of 1000 SF for one sensor. Provide multiple sensors where needed for space coverage.
  - D. Sensor shall have provisions for manual-off function for lighting circuit from remote momentary switch (reset when not occupied) or maintained (off override).
  - E. Provide an additional single-pole, double throw isolated contact with each power pack for remote interface.
  - F. Integral photosensor for delaying turn-on of fixtures when sufficient light available in the space. Provide in ceiling mounted sensor where noted on drawings and as coordinated with the manufacturers device layout drawings. Quantity of devices shall be provided such that the entire square footage of the space is covered.
  - G. Power pack for remote mounting to match occupancy sensor.

- H. Verify color with Architect.
- I. All components to have 5-year warranty.
- J. Manufactured by Lutron.
- K. Base bid includes four (4) additional occupancy sensors complete with installation, mounting and 50 feet of conduit with circuitry per device. Occupancy sensor shall be installed where designated by the Engineer. All unused occupancy sensors shall be transported to the building area as directed by the Owner.

### 2.3 Automatic Load Control Relays

- A. Emergency Bypass Relay – 20 amp electrically held relay to power lights on during loss of normal power circuit is operated by switch circuit when normal power available. Relay to be UL 924 listed. Unit to have automatic test functions (hold emergency light on 2.5 sec. or equal). Unit to be mounted in junction box either above accessible ceiling or in flush box – when installed below ceiling. Provide a 5-year replacement warranty. Refer to detail on drawings.
- B. Automatic Emergency Power Transfer Control Relay – Unit for switching both hot and neutral for separate emergency or dimmed lighting power circuits. 20A rated dual 120V and 277V to switch or dim from a normal circuit. Unit to turn on or full bright on loss of normal power. Relay to be UL 924 listed. Unit to have automatic test function (hold emergency light one 2.5 seconds or equal). Unit to be mountable in junction box above accessible ceiling or in flush box when installed below ceiling level. Provide a 5-year replacement warranty. Refer to detail on drawings.

### 2.4 Electronic Low Voltage (0 – 10V) Dimmer

#### A. General Requirements

- 1. Utilize air gap off, activated when user selects "off" to disconnect the load from line supply.
- 2. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
- 3. Provide radio frequency interference suppression.
- 4. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
- 5. Dimmers: Provide full range, continuously variable control of light intensity.
- 6. Dimmers for Electronic Low Voltage (ELV) Transformers:
  - a. Provide circuitry designed to control the input of electronic (solid-state) low voltage (ELV) transformers. Do not use dimmers that utilize standard phase control.
  - b. Provide resettable overload protection that provides automatic shut-off when dimmer capacity is exceeded. Do not use protection methods that are non-resettable or require device to be removed from outlet box.
  - c. Designed to withstand a short, per UL 1472, between load hot and either neutral or ground without damage to dimmer.
- 7. Fluorescent Dimmers:
  - a. Provides direct control of fluorescent dimming ballasts up to the ballast manufacturer's specified rating.

#### B. Preset Smart Wall Dimmers and Switches:



1. Dimmer Control: Multi-function tap switch with raised rocker for dimmer adjustment.
  - a. Rocker raises/lowers light level, with new level becoming the current preset level.
  - b. Switch single tap raises lights to preset level or fades lights to off.
  - c. Switch double tap raises light to full on level.
  - d. Switch tap and hold slowly fades lights to off over an extended period.
  - e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
  - f. Preset Smart Dimmer: 3-wire fluorescent ballast/LED driver (6 A, 120 V); multi-location capability using companion dimmers (up to nine companion dimmers may be connected); minimum load requirement.
  - g. Companion Dimmer: Provides multi-location capability for compatible dimmers.
- C. Preset Smart Wall Dimmers and Switches with Wireless Communication Inputs:
  1. Communicates via radio frequency with up to nine compatible occupancy/vacancy sensors and/or wireless control stations, and one daylight sensor.
  2. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
    - a. Rocker raises/lowers light level, with new level becoming the current preset level.
    - b. Switch single tap raises lights to preset level or fades lights to off.
    - c. Switch double tap raises light to full on level.
    - d. Switch tap and hold slowly fades lights to off over period of 10 seconds.
    - e. LEDs adjacent to tap switch indicate light level when dimmer is on, and function as locator light when dimmer is off.
- D. Dimmer shall be rated for the wattage it is supplying. Contractor shall coordinate lighting load on each respective dimmer and provide properly rated dimmer accordingly (600w to 1000w).
- E. Contractor is responsible to coordinate the dimmer with each lighting manufacturer and verify that dimmer is compatible and capable of controlling lighting loads/fixtures from fixture manufacturer being supplied on the job.
- F. Verify color of dimmer with architect prior to ordering.
- G. Dimmer shall control loads down to 1% .
- H. 0-10v electronic digital dimmer shall be Lutron Maestro Series or approved equal by Lutron.
- 2.5 Provide a device plate to suit each particular application. Cover all empty outlet boxes with a blank plate. Coverplates shall be manufactured by Pass and Seymour, Hubbell, Cooper, Bryant, Leviton or Mulberry; Taymac is an acceptable manufacturer for weatherproof non-metallic coverplates Multi-Mac Series, "While-In-Use" type, 3.5 inches depth, opaque grey, locking tab marked "EXTRA Duty".
- 2.6 In finished spaces, wall plates shall be nominal .032 inch thick, made of 302 high nickel stainless steel with brushed satin finish and beveled edges. Screws shall be metal with countersunk heads and finished to match plates. Sectional plates will not be permitted.
- 2.7 Installations consisting of three or more wall switches or wall box dimmers mounted together with either separate coverplates or a common coverplate shall have each coverplate engraved so as to identify the circuits or fixtures being controlled by each switch or dimmer. Refer to the drawings for special instructions.

- 2.8 Convenience outlets or switches controlling lighting fixtures served by emergency circuits shall be covered by a plate engraved "EMERGENCY" in 0.25" high letters with letters filled in with red or white dye or paint.

### **PART 3 - EXECUTION**

- 3.1 Locate devices as shown on the drawings, coordinate exact location with other trades, to avoid interference. Check for potential interference from door swings, cabinets, HVAC equipment and other wall mounted devices.
- 3.2 Clean debris from device boxes prior to installation of devices. Adjust devices and coverplates to be flush and level.
- 3.3 Occupancy Sensor Installation
- A. Verify location of occupancy sensor(s) with selected manufacturer prior to rough-in to minimize false activation of the device. Locate sensor and adjust activation field to avoid nuisance activation by movement outside of the controlled space. Sensors shall sense any human motion in the space and allow turn on with entrance into the space.
  - B. Provide all material and labor for a complete and operational system including power and slave packs, auxiliary relay modules and backboxes. Verify application voltage rating and provide proper rated devices.
  - C. Low voltage wiring can be open wired above accessible ceilings, utilize plenum rated cabling. Installation in exposed or inaccessible locations shall be installed in conduit.
  - D. Coordinate time delay off setting of each occupancy sensor with the Owner. Maximum time delay off shall be 30 minutes. Minimum off delay is 10 minutes for intermittent use spaces.
  - E. Maintain 6 feet (minimum) to 8 ft. distance from an HVAC air outlet.
- 3.4 Emergency Lighting Control Relay Installation
- A. Install per manufacturer's instructions. System operation to be connected to be operable at all times.
  - B. Provide all material and labor for a complete and operational system including verify voltage rating and provide properly rated devices.
  - C. Emergency and normal circuits are to be identified on relay or box cover.
  - D. Verify operation for each operating condition.
- 3.5 Functional Testing – Lighting control devices and control system shall be tested to ensure the control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions.
- A. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance, lights turn off only after space is vacated and do not turn on unless space is occupied.

- B. Confirm that the placement, sensitivity and adjustments of daylight sensors yield acceptable performance.
- C. Testing shall be performed by equipment supplier. Provide report to Engineer.

END OF SECTION



## 26 24 16 PANELBOARDS

### PART 1 - GENERAL

- 1.1 Each panelboard shall comply with all applicable codes, recommended practices and standards of IEEE, NEMA and UL. Panelboard shall be UL labeled.
- 1.2 The panelboard manufacturer shall supply equipment which is rated, listed, and labeled for the available short circuit current and the fuse/circuit breaker combinations indicated on the drawings.

### PART 2 - PRODUCTS

#### 2.1 Panelboard Types

##### A. 240 Volt (Maximum) AC Panelboards

1. Breakers shall be "bolt-on" type and in sizes thru 100 amp shall be minimum 10,000 amp, I.C. rated with adequate rating to interrupt the available fault current, for a fully rated system.
2. GFCI breaker – UL Class A (5 milliampere sensitivity, combination type). Ground fault circuit protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection. Space required in panelboard shall be same as standard single pole circuit breaker.
3. AFCI Breaker – UL 1699 (arc fault sensitivity, combination type). Arc fault circuit protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection. Space required in panelboard shall be same as standard single pole circuit breaker. Circuit breaker to be capable to operate with downstream GFCI receptacle in circuit.
4. AFCI / GFCI Breaker – UL 1699 (arc fault) and UL class A (ground fault) dual function circuit breaker. Protection shall be integral part of the branch circuit breaker which also provides overload and short circuit protection. Space required in panelboard shall be same as standard single pole circuit breaker.
5. Panelboard by Square D Type "NQOD".

##### B. 277/480 Volt AC Panelboards

1. Breakers shall be "bolt-on" type and in sizes thru 100 amps shall be minimum 14,000 amp I.C. rated with adequate rating to interrupt the available fault current; for a fully rated system.
2. Panelboards by Square D type "NF".

##### C. Circuit Breaker Distribution Panelboard

1. Removable front with hinged door. Bussing braced for the available fault current; 1200 amp bussing and less.
2. Main and branch breakers shall be solid state trip molded case type with long time, short time, instantaneous trip and ground fault protection – with zone interlocking with the main solid state trip molded case breaker or remote switchgear feeder circuit breaker./Breakers shall be molded case type, thermal-magnetic protection, 80 percent rated.
3. Power and distribution panelboards by Square D "I-Line".

- 2.2 Refer to "Identification for Electrical System" Section 26 05 53, for nameplate requirements.

- 2.3 Refer to Section 26 24 17 "Panelboard with Surge Protective Device" for panelboards with surge suppression and filter system built into panelboard enclosure.
- 2.4 General Construction
- A. Code gauge, galvanized steel tubs with minimum 4 inches clear gutters all sides. Minimum tub width 20 inches, depth 5 inches.
  - B. Locking type reinforced doors with concealed hinges; equipped with directory card holder on inside of door; enameled finish. Doors over 48 inches high shall have 3 point latch and vault locks. All locks shall be master keyed cylinder, keyed alike.
  - C. Provide door-in-door construction. Outer door to be mounted with piano hinge and include lock.
  - D. Permanent individual breaker pole numbers affixed adjacent to each breaker in a uniform position consisting of a stamped metallic or painted numeral.
  - E. Bussing shall be copper.
  - F. Branch circuit panelboard tubs and fronts shall be sized to have 225 amp bussing and accommodate 42 poles unless indicated otherwise on the drawings. Furnish number of breakers shown.
  - G. A neutral bar assembly (when required) and separate ground bar assembly shall be provided. Each assembly shall be copper and have the adequate number of terminals, of sufficient size and type of anti-turn solderless lugs. Each assembly shall have conductor terminal screwdriver slots facing the front of the panel. Bond ground bar assembly to panel cabinet.
  - H. Terminals for feeder conductors to the panelboard mains, neutral, ground and branch circuit breaker wiring shall be suitable for the type of conductor specified.
  - I. Main or sub-feed breakers shall be provided where indicated. Shunt trip breakers where specified, shall have 120 volt coil and coil clearing contacts.
  - J. Where main or sub-feed contactors are indicated, they shall be ASCO Bulletin #920-114 or Square D Type "PB" electrically operated, mechanically held contactor. The operating coil shall be 120 volt with 2-wire control. Provide a separate hinged door and lock matching panel lock, for main and sub-feed contactors.
  - K. Circuit breakers shall be thermo magnetic, bolted type and where more than one pole is used, they shall employ a common trip.
  - L. Breakers in panelboards used for switching of 120 and 277V. fluorescent lighting circuits shall be rated for switching duty UL "SWD" or "HID" type; for switching high-intensity discharge lighting shall be "HID" type.
  - M. Breakers used for protection of heating, air conditioning and refrigeration equipment shall be UL "HACR" type.
- 2.5 The panelboards and breakers shall be adequately rated for the available fault current as indicated on the drawings and in the specifications. The total breaker and fuse short circuit and overcurrent protective system shall be U.L. Fully Rated System.

**PART 3 - EXECUTION**

- 3.1 Mount top of wall mounted cabinets 6 feet 0 inches above floor. Coordinate location of recessed panels so they are accessible and to avoid interference with other equipment and trades. Mount and anchor floor set panelboards on a 4 inch high concrete pad furnished by this Contractor.
- 3.2 The position of breakers in each panel shall be arranged in the field for sequence phasing by this Contractor to best suit wiring conditions and balancing of phases. Fill in, typewritten, the directory of each branch circuit panelboard.
- 3.3 The circuits from AFCI breakers shall be connected with independent neutral conductors i.e., no shared neutral conductors.
- 3.4 For multi-wire branch circuit group circuit breaker together and provide breaker handle tie. Group conductors together with tie-wrap.
- 3.5 Adjust circuit breaker trip and time delay settings to values as indicated in the coordination study.

END OF SECTION





## 26 27 16 ELECTRICAL CABINETS AND ENCLOSURES

### PART 1 - GENERAL

- 1.1 Work includes all special cabinets and enclosures; equipment shall conform to requirements of N.E.C. and shall be UL labeled.

### PART 2 - PRODUCTS

#### 2.1 Telephone Miscellaneous Cabinets

- A. Indoor cabinets shall match panelboard finish and construction and shall be manufactured by Siemens, Square D, Eaton, Tanco Inc., Park-Ohio or G.E.
- B. Outdoor enclosures shall be manufactured by Hoffman, Rittal Corp., Milbank, Tanco Inc. or Hennessy Products.
- C. Provide backboard for mounting equipment,  $\frac{3}{4}$  inch plywood. Paint matte white.

#### 2.2 Indoor Cabinets - NEMA 1

- A. Cabinets shall be galvanized code gauge steel, finished gray enamel or manufacturer's standard equivalent finish, of sizes shown with flush painted hinged door and master keyed cylinder locks keyed to match panelboard locks. Cabinets in finished areas shall be designed for flush mounting with separable front overlapping flange. Cabinets in concealed areas shall be surface mounted types.
- B. Each cabinet shall be equipped with a 0.75 inch thick waterproof fir plywood backboard painted gray.

#### 2.3 Outdoor Enclosure - Single Door - Small

- A. The enclosure shall meet or exceed the requirements of a NEMA 3R rating and shall be UL listed.
- B. The cabinet and door shall be constructed from 5052-H32 sheet aluminum alloy; 0.125 inch thick. The door opening shall be double flanged on all four sides.
- C. The cabinet door shall be a minimum of 80 percent of the front surface area and shall be gasketed (UL 508 table 21.1) with weather tight seal between the cabinet and door.
- D. The hinges shall be continuous and made of 0.063 inch stainless steel with 0.120 inch diameter stainless steel hinge pins.
- E. The latching mechanism shall be a slam type with Corbin #R357SGS, or equal lock with keyhole cover for NEMA 3R enclosure; for NEMA Type 4X enclosure, the latch shall be weather tight quarter turn type. Furnish 2 keys with each lock.
- F. Provide aluminum back panel 0.125 inch thick complete with all mounting hardware.
- G. Cabinet finish shall be natural aluminum finish or factory painted using the three step iron phosphate conversion technique; standard grey color unless indicated otherwise.

- H. Cabinet mounting plates shall be located at bottom and top of enclosure for either in wall mounting or surface mounting.

**PART 3 - EXECUTION**

- 3.1 Mount the cabinets and enclosures as indicated on the drawings and in accordance with manufacturer's instructions.
- 3.2 Mount top of wall mounted cabinets 6 feet-0 inches above floor. Coordinate location of recessed cabinets so they are accessible and to avoid interference with other equipment and trades.
- 3.3 Mount and anchor floor set enclosures on a concrete pad furnished by this Contractor. Indoor pads shall be 4 inches high; outdoor pads shall be steel reinforced as indicated on the drawings.
- 3.4 Provide the concrete base for the pad-mount transformer and secondary enclosure. Pad shall be minimum 10 inches thick, 4000 pound test concrete with #4 rebar 12 inches on center each way in center of pour. Pad shall extend 6 inches past enclosure on all four sides with chamfered edges. Form sleeves in pads for conduit entry and place conduits prior to pouring. Pad shall be 3 inches above and 7 inches into finished grade. Over excavate and provide a 12 inch thick compacted pea gravel sub-base below pad.
- 3.5 Refer to "Identification for Electrical System" Section for nameplate requirements.

END OF SECTION

**26 27 26 WIRING DEVICES AND COVERPLATES**

**PART 1 - GENERAL**

- 1.1 Wiring devices are identified on the drawings per legend symbols or as specifically noted. Receptacles are identified in the legend by NEMA configuration numbers only. Catalog numbers from acceptable manufacturers for the common wiring devices shall be as listed herein. Catalog numbers are not listed for all devices. Other devices, such as clock hanger outlets, etc. shall be furnished by one of the manufacturers listed and shall be equal in quality to the device series listed.
- 1.2 When shop drawings are required for wiring devices and coverplates, the submittal shall be comprehensive for all wiring device configurations listed in the legend and for devices specifically noted on the drawings.

**PART 2 - PRODUCTS**

- 2.1 Extra hard use specification grade receptacles shall be listed by Underwriters Laboratories, Inc. Receptacles shall be minimum 20 ampere, 125 volt, NEMA configuration 5 20R and ivory in color unless noted otherwise.

Acceptable Manufacturer	Single	Duplex	Ground Fault	Isolated Ground
Cooper	5361-V	AH5362V	VGF20V	IG5362-V 3
Bryant	5361-I	5362-I	GF20ILA	5362IG-I
Hubbell	HBL5361-I	HBL5362-I	GF20ILA	IG8300
Leviton	8361-I	5362A-I	7899-I	8300-IGI
P&S	8301-I	5362A-I	2095-I	IG5362-I

- 2.2 Receptacles installed in a damp or wet location shall be a listed weather-resistant (WR) type.
  - A. Receptacle shall be installed in a listed weatherproof enclosure, whether or not the attachable plug cap is inserted.
- 2.3 Provide GFCI devices as shown on drawings and in compliance with NEC 210.8 for type and location. Where GFCI receptacle devices not available at rating required a GFCI protection device to be provided. Bender Lifeguard series.
- 2.4 Transient voltage surge suppressors (SPD-ANSI/IEEE Category A and B), UL 1449 suppression (clamping) rating of 400 V, 3 mode protection (LN/LG/NG) for 120 V branch circuits:
  - A. Duplex receptacles, 120 V, 20 A shall be Pass and Seymour 6362-ISP, Hubbell HBL5362ISA, Leviton 5380-I, Bryant SP53-TIGIA or Cooper/Arrow Hart 5362IS. Receptacle to be listed UL 1449 Type 3.
  - B. Suppression strip with a heavy duty 6 ft. 14-2 AWG power cord, 6 electrical NEMA 5-15R 120V, 15 A outlets, computer grade on/off 20 A switch, resettable circuit breakers, internal thermal fusing, hybrid suppression circuit and comprehensive diagnostics. Strip to be listed UL 1449 Type 3.

EFI Electronics Corp. - Model 453 (15 A Overload Protection)  
 Wiremold Sentrex "High Performance" - Model M6S (10 A Overload Protection)  
 Joslyn Electronic Systems - Model 1203-03 (15 A Overload Protection)  
 Pass and Seymour - Model PS7 (15 A Overload Protection)

Hubbell Model HBL6PS350A (15A Overload Protection)  
Leviton Model 5300-PS

- 2.5 Provide a device plate to suit each particular application. Cover all empty outlet boxes with a blank plate. Coverplates shall be manufactured by Pass and Seymour, Hubbell, Cooper / Arrow Hart, Bryant, Leviton or Mulberry; Taymac is an acceptable manufacturer for weatherproof non-metallic coverplates Multi-Mac Series, "While-In-Use" type, 3.5 inches depth, opaque grey, locking tab. Provide "jumbo" size plates for outlets installed in masonry walls.
- 2.6 In finished spaces, wall plates shall be nominal .032 inch thick, made of 302 high nickel stainless steel with brushed satin finish and beveled edges. Screws shall be metal with countersunk heads and finished to match plates. Sectional plates will not be permitted. Each lighting control coverplate shall be engraved so as to identify the circuits (panel & circuit #) or fixtures being controlled by each switch or dimmer. Each receptacle or device coverplate shall be engraved to identify the panel and circuit # serving the particular device.
- 2.7 Coverplates for telephone and other communication system outlets shall be a blank coverplate or shall have a 0.625 inch diameter grommeted opening unless indicated otherwise on the drawings or in the respective communication system specifications. Color and material of plates shall match plates provided for other wiring devices (for 302 stainless steel, 0.625 inch I.D. grommet in 0.875 inch hole, strap mounted; two gang equal to P & S Sierra #S 788N; single gang #S 754N; for high impact thermoplastic, 0.375 inch hole single gang, strap mounted equal to P & S Sierra #RP 12 I where P line ivory wallplates are used).

### **PART 3 - EXECUTION**

- 3.1 Locate devices as shown on the drawings, coordinate exact location with other trades, to avoid interference. Check for potential interference from door swings, cabinets, heating equipment and other wall mounted devices.
- 3.2 Clean debris from outlet boxes.
- 3.3 Install receptacles with grounding pole on bottom.
- 3.4 Verify each receptacle device is energized and test each device for proper polarity.
- 3.5 Adjust devices and wall plates to be flush and level.

END OF SECTION

**26 28 13 FUSES**

**PART 1 - GENERAL**

- 1.1 Safety switches and other fusible protective devices provided under this contract shall be complete with fuses properly sized to protect the feeders and equipment served.
- 1.2 Fuses shall not be shipped installed in switches in electrical equipment nor shall they be shipped to the job site until the equipment is ready to be energized. Fuses shall be of the same manufacturer to retain selectivity as designed.

**PART 2 - PRODUCTS**

- 2.1 Manufacturers shall be Bussmann, Mersen, Littelfuse or Edison.
- 2.2 Fuses shall be current limiting with 200,000 amperes interrupting capacity, all shall be UL labeled.
- 2.3 Fuses, 601 ampere to 6,000 ampere (bolt type dimensions) shall be UL Class "L" fuses. The size and type is indicated on drawings; Bussmann HI CAP time delay fuse KRP C shall be used.
- 2.4 Fuses with ampere ratings 1 ampere to 600 ampere (standard dimensions) shall be UL Class RK 1. The size and type is indicated on drawings. Bussmann LOW PEAK Time Delay fuse LPN RK (250 volts) or LPS RK (600 volts).
- 2.5 Where Bussmann specific fuse types are indicated above or on the drawings, acceptable fuses by cross reference of manufacturers are:

Voltage UL Class	Ratings	Bussmann	Mersen	Littel Fuse	Edison
L	600 V	HI CAP KRP C	AMP TRAP A4BQ( )	POWR-PRO KLPC	LCL
RK 1	250V 600V	Low Peak LPN RK LPS RK	AMP TRAP II A2D ( ) R A6D ( ) R	POWR-PRO LLN-RK LLS-RK	LEN-RK LES-RK
J (Time Delay)	600V	LPJ ( )	AJT ( )	JTD ( )	JDL ( )

**PART 3 - EXECUTION**

- 3.1 Place a fuse identification label showing type and size inside door of each switch. Use fuse reducers where fuse gaps are larger than fuse dimension.
- 3.2 Verify fuse types before installation for proper application by voltage and ampere ratings; fuses protecting motors shall not exceed 150 percent of motor nameplate amps. (Applies to fuses in sizes 600 amps and below.)

- 3.3 Furnish the Owner with a minimum of 25 percent of quantity of each size installed, but not less than one complete set of three spare fuses for each size of fuse furnished. Provide cabinet with door and latch, install adjacent to main service entrance equipment or where there are only a small quantity of spare fuses, provide a spare fuse board adjacent to each applicable fused panel and mount fuses on backboard. Provide a typewritten bill of material and install in plastic cover to inside of cabinet door.

END OF SECTION

**26 28 16 DISCONNECT SWITCHES**

**PART 1 - GENERAL**

- 1.1 Provide disconnect switches, fused and non-fused, where indicated on the drawings and in the specifications, and where required by the N.E.C.

**PART 2 - PRODUCTS**

- 2.1 Disconnect switches shall be listed by Underwriter's Laboratories and shall be manufactured by Square D. All starters and disconnect switches shall be of the same manufacturer unless otherwise approved.
- 2.2 Switches shall be Heavy-Duty Type, NEMA 1 enclosures, non-fused except where fuses are specified or required to protect wiring from overload; provide raintight NEMA 3R type enclosures for outdoor applications unless otherwise noted.
- 2.3 Disconnect switches shall be quick-make, quick-break, externally operated with door interlocked with operating handle. Provide solid neutral and ground bars where indicated or where required by the application.
- 2.4 Disconnect switches shall have multiple padlock provisions in the off position.
- 2.5 The fuse holders shall be designed for Class "R" rejection type fuses.
- 2.6 Refer to "Identification for Electrical Systems" Section for nameplate requirements.

**PART 3 - EXECUTION**

- 3.1 Mount top of wall mounted disconnect switch 6 ft.-0 inches above floor where space permits.
- 3.2 Coordinate location of disconnect switches to avoid interference with other equipment and trades and allow access for safe operation.

END OF SECTION





## 26 29 13      **MOTOR CONTROLLERS**

### **PART 1 - GENERAL**

- 1.1 Schedules on the drawings list motors with disconnect and starter requirements and associated controls. Motor starters and disconnects shall be furnished under this Contract except where specifically shown or specified to be furnished by other trades. Motor starters and disconnects shall be manufactured and rated in accordance with NEMA, UL and IEEE standards. IEC RATED CONTACTORS AND OVERLOADS ARE NOT ACCEPTABLE.
- 1.2 Refer to "Disconnect Switches" Section for switch requirements.
- 1.3 All motor starters shall be rated for the available fault current at the point of application.

### **PART 2 - PRODUCTS**

- 2.1 Manufacturer Allen Bradley, whose catalog numbers are used herein as a standard, or equivalent by Square D Type S (Class 8536), G.E. Series CR306, Eaton Class AN16 or Siemens "U.S. Series". All starters and disconnect switches shall be of the same manufacturer unless otherwise approved.
- 2.2 Where new motor starters and disconnect switches are to be installed in existing motor control centers they shall match existing units.
- 2.3 Magnetic starters shall be line voltage suitable for the service listed on the drawings. Each starter shall have one extra auxiliary contact for future control purposes, a 3 leg melting alloy thermal overload relay on a single block, a manual reset mechanism, a 120 volt control coil, Bulletin 509. Contractor shall have the option of installing Bulletin 512 combination starters in place of separately mounted switches and starters. Disconnects shall be non-fused type unless otherwise specifically indicated or required by NEC.
- 2.4 A HAND-OFF-AUTO selector switch shall be mounted in the face of each starter enclosure. The selector switch shall be so wired that when it is in the HAND or AUTO position, all SAFETY controls are wired in series with the selector switch; all CONTROL DEVICES shall be wired in the AUTO position only.
- 2.5 Each starter enclosure shall have a suitable 120 volt secondary control transformer fused separately on each phase of the primary and secondary, and grounded on the secondary.
- 2.6 Each starter shall have a red LED pilot light mounted in the face of the starter enclosure. The LED shall be wired so it will be on when the motor is energized.
- 2.7 Magnetic starters shall be furnished for motors, one horsepower and greater or any 3 phase motor, unless indicated otherwise on plan.
- 2.8 Provide adjustable 0 to 60 second "on" time delay relay on starters where indicated on drawings and wire into the "auto" position of the selector switch to delay motor starting.
- 2.9 Provide adjustable phase failure-reversal-undervoltage relay protection on all motor starters NEMA size 3 and larger; wire ahead of the H-O-A switch.
- 2.10 Manual starters with thermal overload protection shall be furnished for fractional horsepower, single phase motors unless otherwise noted and shall be Bulletin 600 with a pilot light, flush mounted in finished areas.

- 2.11 Unless otherwise noted or required by Code, safety switches shall be Heavy Duty Type, NEMA 1 enclosures, non-fused except where fuses are specified or required to protect wiring from overload. Switches shall be quick make, quick break, externally operated with door interlocked with operating handle and padlock provisions in OFF position. Provide solid neutral and ground bars where required. Switches located outside shall be raintight NEMA 3R, unless otherwise noted.

### **PART 3 - EXECUTION**

- 3.1 Check full load ampere and service factor rating of each motor after installed and furnish the proper size overload heater elements to protect the motor.
- 3.2 Provide a permanent directory card with frame and transparent protector with typewritten information identifying each motor by number, location, service, HP, electrical characteristics, full load amps and overload heater size. Directory shall be displayed on the front of the motor control center or motor starter panelboard.
- 3.3 Those portions of interlock and control wiring which are required but not prewired, shall be done in the field.
- 3.4 Motor starters and disconnect switches shall be conveniently accessible; all NEC minimum clearances from walls, pipes, ducts, equipment, etc., shall be maintained. Locate as inconspicuously as possible in finished spaces.
- 3.5 Refer to "Identification for Electrical Systems" section for nameplate requirements.
- 3.6 Place label in each motor starter door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, voltage / phase, OL type and OL size.

END OF SECTION

**26 43 13 SURGE PROTECTIVE DEVICES (SPD'S) FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS**

**PART 1 - GENERAL**

1.1 This specification describes the mechanical and electrical requirements for a low voltage Surge Protective Device (SPD); refer to Article 285 of the NEC. The SPD shall be suitable for application in category environments as described.

1.2 The SPD with integral disconnect switch and overcurrent protection shall be UL Listed for parallel connection to the electrical system. Delete if connected to a dedicated operable OCP device.

1.3 Refer to the following specification sections for factory installation of the SPD in equipment:

26 24 13 Distribution Panelboard (Below 600 Volts)  
26 24 17 Panelboard with Surge Protective Device

1.4 Submit the following for approval:

- A. All related shop drawings, product data, manufacturer's installation instructions and maintenance manuals.
- B. Dimensional drawing of each SPD type indicating mounting arrangements.
- C. Single line diagram indicating all field connection requirements, conductor and overcurrent sizes, recommended conduit type, alarm contacts, etc.
- D. Maximum Surge Current Rating: Provide test reports demonstrating that the SPD is capable of surviving the specified maximum surge current rating. The rating shall be provided on a per mode basis. Reports shall clearly show that the tests have been performed on a COMPLETE SPD including all necessary fusing, thermal disconnects, integral disconnects, monitoring systems, etc.
- E. Minimum repetitive surge current ratings: Test reports from a third party testing organization will demonstrate that a COMPLETE SPD has been tested to specified ratings. A complete device will include all necessary fusing, thermal disconnects, integral disconnects, monitoring systems, etc.
- F. Provide name of the nationally recognized independent testing laboratory that performed tests verifying that the COMPLETE SPD can survive the published surge current rating on a per mode and per phase basis and at maximum surge current level the fuses survive without blowing when the manufacturer recommended disconnect and overcurrent protection are installed in same test and circuit.
- G. UL documented Voltage Protection Ratings (VPR) for all modes. (L-L, L-N, L-G, N-G)
- H. Short Circuit Current Rating (SCCR).
- I. Maximum Continuous Operating Voltage Rating (MCOV).
- J. I-nominal (I-n).
- K. Type listing.

- 1.5 Manufacturers Qualifications: Firms regularly engaged in the manufacture of SPD products for specified category and whose products have been in satisfactory service for not less than 5 years.
- 1.6 NEMA Compliance: Comply with NEMA Standards Publication No. LS-1 or latest edition in effect.
- 1.7 UL compliance and labeling: Listed per latest edition of UL 1449 Third Edition and latest editions of UL 1283 and UL 1414 for Electromagnetic Interference Filters, where applicable.
- 1.8 SPD shall be independently laboratory tested.
- 1.9 NEC compliance: Comply with NEC as applicable to construction and Article 285 for installation. The mounting position of the SPD shall permit a short lead length.
- 1.10 In accordance with NEC Article 285, the SPD shall be clearly marked with the short circuit current rating. The SCCR rating shall meet or exceed the rating of the equipment to which it will be applied. Providing additional fusing to meet this requirement shall not impact the maximum surge current rating or the minimum repetitive surge current rating. Test reports furnished from third party testing organizations shall verify this.
- 1.11 The SPD shall be warranted for unconditional failure replacement for a minimum of 10 years inclusive of all labor to restore the device to functionality. The first 5 years of this warranty will include the field labor required to remove/replace/or repair the failed SPD. Submit Warranty with shop drawings.
- 1.12 The SPD MOVs will be individually fused to provide full system redundancy and provide a short circuit current rating of 200kAIC. The fusing system will also allow the full maximum surge current rating to pass through without fuse operation.
- 1.13 By ANSI/IEEE C62.45 definition, "Category C3 Combination Wave" is 20 KV 1.2 microsecond open circuit voltage, 10 kA 8/20 microsecond short circuit current. Where category C3 is referenced in this specification, it shall mean the same.
- 1.14 The overcurrent protection/disconnect device shall have a short circuit current rating SCCR greater than that available on the electrical distribution system.

## **PART 2 - PRODUCTS**

- 2.1 For panelboards with integral surge suppression and filter system where indicated on the drawings, refer to Section 26 24 17 Panelboard with Surge Protective Device.
- 2.2 The SPD shall be compatible with the electrical system, voltage, current and distribution configuration; for single phase connected electrical system provide the appropriate SPD.
- 2.3 The SPD shall use only solid state clamping components to limit the surge voltage.
- 2.4 The SPD shall use LED indicators, which provide indication of proper suppressor operation and of suppression-failure; provide means for assuring lamps are operable. Include optically isolated N/C drop contacts for remote monitoring.
- 2.5 A means of mechanical safety disconnect shall be provided with a symmetrical fault current commensurate with the installation location. This disconnect shall be used for isolating the SPD

from the electrical service for repair/testing without taking the whole panelboard, switchboard, or ATS out of service.

### **PART 3 - EXECUTION**

- 3.1 For switchboard applications, connect the SPD to the main bus. Provide a 3 pole molded case breaker or fusible switch with overcurrent protection integral with the SPD enclosure to serve as a means of mechanical disconnect. Fuse sizes and type shall be provided by the SPD manufacturer. Provide 3 spare fuses for each SPD. Note: The SPD and overcurrent/disconnect device shall have a short circuit current rating SCCR greater than that available on the electrical system.
- 3.2 All conductors shall be copper and sized per the manufacturer's recommendations. The conductors are to be as short and straight as practically possible and shall not exceed 18 inches in length and shall be installed in PVC conduit (as local jurisdiction allows) where raceway is required. The input conductors are to be twisted together to reduce the SPD system inductance.
- 3.3 The SPD shall be installed following the SPD manufacturer's recommended practices and in compliance with all applicable codes.
- 3.4 A SPD will not withstand an overvoltage condition. Disconnect each SPD before using testing equipment on the system such as meggers and high voltage test equipment.
- 3.5 Before energizing the SPD and before installation of the SPD shall be considered complete, the Contractor shall verify the integrity of the ground system to which the SPD is connected including grounding of all service entrance neutrals and neutrals of all separately derived systems as required by the NEC.

END OF SECTION



**26 51 13 INTERIOR LUMINAIRES, LAMPS AND BALLASTS**

**PART 1 - GENERAL**

- 1.1 Refer to schedule on the drawings for information on luminaires, lamps and manufacturers. Luminaires of manufacturers other than those listed, if offered, shall be on a substitute basis and so listed as a substitute with the bid. (Refer to Section 26 05 01, para. 2.3 B.)
- 1.2 The catalog numbers listed on the schedule do not necessarily have complete prefix and suffix designations for placing the luminaire order. The Contractor shall verify these numbers and include in his bid the necessary plaster frames, accessories, trim, mounting hardware, etc. to achieve a coordinated installation with ceiling types indicated on the architectural drawings and in specifications. The Contractor shall provide any hardware indicated by notes on the fixture schedule.
- 1.3 Luminaires, drivers and individual components shall bear UL label.
- 1.4 Luminaires shall have an internal disconnect means, integral with the unit, complying with NEC Article 410. Means shall disconnect all supply conductors including the grounded conductor.
- 1.5 Interior lighting shall generally consist of LED luminaires with 3500 deg. Kelvin color temp. Luminaires and lamping shall meet current Sinclair Standards where applicable.

**PART 2 - PRODUCTS**

2.1 LED Luminaire Components

A. LED Luminaire

1. LED Luminaire shall be rated for an installation/ambient temperature from -40 degrees C to +40 degrees C.
2. LED luminaire shall be modular in design (when applicable per the basis of design) with the ability to replace drivers, light engines, arrays, optics, reflectors, etc., without having to replace the entire luminaire.
3. The heat sink shall be easily accessible for maintenance or cleaning to maintain the overall thermal performance of the luminaire within specifications. The light engine and driver shall be easily accessible for maintenance.
4. LED luminaire shall have a minimum CRI of 80.
5. LED luminaire (type V distribution) shall have an even distribution of luminous intensity within the 0 degree to 90 degree zone. Luminous intensity at any angle within this zone shall not differ from the mean luminous intensity for the entire 0 degree to 90 degree by more than 10 percent.
6. Exterior LED luminaire shall be full cutoff or fully shielded as defined by IESNA-RP-8.
7. LED luminaire shall come standard with the ability for full dimming.
8. LED Luminaire shall have a minimum of 5 year warranty.
9. Solid State Lighting (LED) – UL 1598.

B. LED/LED Module

1. LED/LED Module(s) shall be manufactured by:
  - a. Nichia
  - b. Cree
  - c. Achriche
  - d. Phillips

- e. Osram/Sylvania
  - f. Approved Equal (By Engineers approval)
  - 2. LEDs shall be of the highest production quality.
  - 3. LED/LED Module shall be rated for 50,000 hours of life at 70 percent output (L70) and shall have been tested in accordance with IESNA LM-79, LM-80, and TM-21.
  - 4. LED/LED Module manufacturers shall adhere to LED package manufacturer guidelines, certification programs, and test procedures for thermal management.
  - 5. LED/LED Module(s) shall be rated for a minimum luminous efficacy of 80 Lumens per Watt (lm/W).
  - 6. Color consistency NEMA SSL-3.
  - 7. LED/LED Module(s) shall have one of the following designated CCTs (Correlated Color Temperature) per ANSI C78.377-2008 and all within the 7-step chromaticity quadrangles as defined below:
    - a. 3500 K
    - b. 4100 K
  - 8. LED/LED Modules shall originate from a common manufactured batch source. Contractor shall provide 5 percent of each module specified as spare in original sealed packaging and transport to the Building (and put in storage) as directed by the Owner.
- C. LED Driver
- 1. The driver shall have 50,000 hrs. of anticipated/rated life. Minimum efficiency of 85 percent at full load conditions.
  - 2. Driver shall be by OSRAM or ADVANCED. No equals.
  - 3. UL 8750 approved.
  - 4. Driver shall meet UL Class 2, FCC 47CFR Part 15, Class A minimum compliant.
  - 5. Driver shall have inherent short-circuit protection, self-limited, overload protected.
  - 6. Driver shall have a Class A sound rating.
  - 7. 100 to 277 volt input rating. Power factor .90 or higher.
  - 8. All drivers shall provide full LED dimming range. The drivers in every LED fixture shall have the capability to be dimmable, whether indicated to be dimmed or not on the drawings.
  - 9. Driver shall have a minimum of 5 year warranty.
  - 10. EC shall provide 5 percent of each driver specified as spare in original sealed packaging and transport to the building (and put in storage) as directed by the Owner.
- D. The complete LED luminaire assembly shall be of the latest and highest efficacy design available.
- E. Equal fixtures/luminaires provided other than the first name specified luminaire, shall at a minimum, provide the same if not more delivered lumens. Additionally the "equal" luminaire shall not exceed the first name specified luminaires total system input watts.



## **PART 3 - EXECUTION**

### **3.1 Submittals**

- A. Detailed cut sheets for all LED luminaire complete assembly shall be submitted for approval with shop drawings. Identifying pertinent information such as the manufacturer, frequency operation, THD, reset thermal protection, etc. Also, submit emergency battery driver cut sheets for review. Shop drawings will be rejected if required information is not submitted.
- B. Submittals shall include dimensions, ratings, performance data and components of each luminaire. Where indicated on schedule, submit two (2) color chips illustrating luminaire finish color.

### **3.2 Luminaire Hanging and Supporting**

- A. Support each surface mounted or suspended luminaire in a minimum of two locations. In addition, where luminaires are in a continuous row, they shall be fastened together on each end in two places. For suspended luminaires provide pendant length required to suspend luminaire at indicated height.
- B. Recessed luminaires shall be supported at all four corners. Additionally, securely fasten each luminaire to the ceiling framing member by mechanical means such as bolts, screws, rivets or approved clips; install a minimum of one on each of the four sides of luminaire. This Contractor shall coordinate luminaire locations and luminaire weight with the trade installing the ceiling system to ensure adequate hangers are installed to support the weight of the ceiling plus twice the weight of each luminaire.
- C. Surface or flush luminaires in ceilings of the suspended lay in type shall be installed so that the long dimension of the luminaire is supported on the main support members of the ceiling system.
- D. In addition, all recessed luminaires for lay in ceilings shall be equipped with at least two galvanized steel safety support wires, attached from the luminaire housing to the structure independent of the ceiling system; hangers supporting ceiling system shall not be used.
- E. Do not support light fixtures directly from light weight roof decks. Provide supplemental angle iron support as required. Do not connect to bottom cord of roof joist without supplemental angle iron ties to the upper cord of joist.
- F. Wire battery powered emergency fixtures to circuit constantly on. For fixtures switched the circuit is to be extended from ahead of room switch.

### **3.3 Alignment and Cleaning**

- A. Luminaires shall be mounted straight, level and true to the building lines. Warped or damaged luminaires shall be replaced or repaired to the satisfaction of the Architect and Owner.
- B. Immediately preceding the final inspection, this Contractor shall thoroughly clean all luminaires of dust, dirt, grease, fingermarks, etc. All lamps shall be operating at the time of Owner's acceptance.
- C. Coordinate location of luminaires carefully with the Architectural reflected ceiling plan. Verify that no surface mounted luminaire interferes with door swings.

1. Coordinate locations of luminaires with mechanical ducts, sprinkler pipes/heads, smoke alarms and fire alarm devices prior to rough-in to prevent conflicts.
  2. Where reflected ceiling plans indicate a larger quantity of luminaires than that shown on the electrical drawings for a particular space, the reflected ceiling plan shall be followed for that space.
- D. Adjust all adjustable fixtures to the satisfaction of the Engineer and the Owner.
- 3.4 Turn over spare LED components to Owner.

END OF SECTION

**26 52 00 EXIT AND EMERGENCY LIGHTING**

**PART 1 - GENERAL**

- 1.1 Exit lighting and emergency lighting system wiring shall be run in conduit system which is completely independent of normal wiring systems.
- 1.2 Equipment to transfer power from a normal source to an emergency source are to be listed and labeled for load transfer.
- 1.3 Base bid includes two (2) additional exit lights of type "X1", complete with installation, mounting and 50 feet of conduit with circuitry per device. The exit sign shall be where designated by the Engineer. All unused exit signs shall be transported to the building area as directed by the Owner.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

- 3.1 All circuits to have dedicated neutral conductor.
- 3.2 Adjust coverage of occupancy sensors and dimming control.
- 3.3 Test system operation for full 90 minutes witnessed by the AHJ. Provide report of required corrections, if any.

END OF SECTION



## 27 05 01 BASIC COMMUNICATIONS REQUIREMENTS

### PART 1 - GENERAL

1.1 Refer to Section 26 05 01 Basic Electrical Requirements which are hereby made part of Division 27 - Communications.

1.2 Special Note

- A. All provisions of the Bidding Requirements, General Conditions and Supplementary Conditions, including Division 00 and Division 01, apply to work specified in this Division.
- B. The scope of the Division 27 work includes furnishing, installing, testing and warranty of all work and complete Communication systems as shown on the T Series drawings, and as specified in Division 27 and elsewhere in the project documents.
- C. Understanding that the contractors for various Divisions are sub-contractors to the Prime Contractor, assignments of work by division are not intended to restrict the Prime Contractor in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.
- D. The project drawings and specifications define scope of work for the various divisions. Such assignments of work are not intended to restrict the Construction Manager in assignment of work among the contractors to accommodate trade agreements and practices or the normal conduct of the construction work. If there is a conflict of assigned work between Divisions 02 thru 33 and Divisions 00 and 01, Divisions 00 and 01 shall take precedence.

1.3 Quality Assurance

- A. Professional performance standards as provided by a qualified and experienced Systems Integrator/Contractor will be required. References and documentation of the system contractor's experience and following qualifications shall be provided, if requested.
- B. The Multimedia Systems Contractor shall:
  - 1. Be an authorized dealer/service organization for all major items of electronic equipment furnished.
  - 2. Employ, on a full-time basis, an Infocomm CTS-D certified audio/electronics Engineer under whose direction and supervision the entire installation shall be carried out.
  - 3. Employ, on a full-time basis, trained technician(s) who are experienced in the installation of sound reinforcement equipment, its interconnector and setup. The lead technician for the entirety of the project shall be CTS-I certified.
  - 4. System Contractors shall have a "Certified Crestron Programmer" on staff. The Contractor shall provide a copy of the certificate bearing the name of the programmer. The same certified programmer shall work on the project in its entirety.

1.4 Alternates

A. Alternate No 003 – Video Wall – Innovation Lab

ADD ALTERNATE

The base bid work Includes a projector and electric screen in the Innovation Lab per the drawings and specifications.

Each bidder is requested to state the addition in cost to provide a Direct View LED Video Wall (of approximately 133" diagonal size) in lieu of the projector and screen. Basis of Design is the Nanolumens Engage series, 1.56mm pitch, front serviceable. Bid alternate price to include factory start up services and minimum 3 year extended warranty.

#### 1.5 Permits and Regulations

- A. Include payment of all permit and inspection fees applicable to the Division 27 work. Furnish for the Owner certificates of approval from the governing inspection agencies, as a condition for final payment.
- B. Work must conform to the National Electrical Code, National Electrical Safety Code and other applicable local, state and federal laws, ordinances and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. Install no work contrary to minimum legal standards.
- C. All electrical work shall be inspected and approved by the local jurisdictional authority.
- D. All electrical work shall be inspected and approved by the Ohio Division of Industrial Compliance who will issue the inspection certificate.
- E. Upon completion of work, the Contractor shall furnish to the consulting State Architect the certificate of inspection and approval before final payment on contract will be allowed.
- F. Final acceptance of all work will also be subject to the approval of the University Physical Plant Department.

#### 1.6 Inspection of Site

- A. Inspect the project site \ and the \ premises of the existing building. Conditions shall be compared with information shown on the drawings. Report immediately to the Engineer any significant discrepancies which may be discovered. After the contract is signed, no allowance will be made for failure to have made a thorough inspection.

#### 1.7 Drawings and Specifications

- A. The drawings indicate the general arrangement of the work and are to be followed insofar as possible.
  - 1. The word "provide", as used, shall mean "furnish and install".
  - 2. The phrase "shall support" shall mean that no additional time, material or labor is required to have the specified referenced feature/function/capability fully operational.
  - 3. If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work.
- B. Make all necessary field measurements to ensure correct fitting. Coordinate work with all other trades in such a manner as to cause a minimum of conflict or delay.
- C. The drawings and specifications shall be carefully studied during the course of bidding and construction. Any errors, omissions or discrepancies encountered shall be referred immediately to the Engineer for interpretation or correction, so that misunderstandings at a later date may be avoided. The contract drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Having wireways and

fittings fabricated and delivered in advance of making actual measurements shall not be sufficient cause to avoid making offsets and minor changes as may be necessary to install wireways, fittings and equipment.

1. Where there are quantity discrepancies of equipment shown on drawings and/or specifications, the Contractor shall provide the greater quantity.
- D. The Engineer shall reserve the right to make minor adjustment in locations of system runs and components where he considers such adjustments desirable in the interest of protecting and concealing work or presenting a better appearance where exposed. Any such changes shall be anticipated and requested sufficiently in advance as to not cause extra work, or unduly delay the work. Coordinate work in advance with all other trades and report immediately any difficulties which can be anticipated.
- E. Equipment, ductwork, piping and communications wiring shall not be installed in the dedicated electrical space above or in the working space required around electrical switchgear, motor control centers or panelboards as identified by NEC 110.26 Spaces About Electrical Equipment – 600 Volts Nominal or Less. For equipment rated over 600 volts nominal – 110.32 Work Space About Equipment – 110.33 Entrance and Access to Work Space – 110.34 Work Space and Guarding. Caution other trades to comply with this stipulation.
- F. Where any system runs and components are so placed as to cause or contribute to a conflict, it shall be readjusted at the expense of the contractor causing such conflict. The Engineer's decision shall be final in regard to the arrangement of conduit, etc., where conflict arises.
- G. Provide offsets in system runs, additional fittings, necessary conduit, pull boxes, conductors, switches and devices required to complete the installation, or for the proper operation of the system. Exercise due and particular caution to determine that all parts of the work are made quickly and easily accessible.
- H. Should overlap of work among the trades become evident, this shall be called to the attention of the Engineer. In such event, none of the trades or their suppliers shall assume that he is relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

#### 1.8 Asbestos Materials

- A. Abatement, removal or encapsulation of existing materials containing asbestos is not included in the Division 27 Contract. Necessary work of this nature will be arranged by the Owner to be done outside of this construction and remodeling project by a company regularly engaged in asbestos abatement. Such work will be scheduled and performed in advance of work in the construction and remodeling project.
- B. If, in the performance of the work, materials are observed which are suspected to contain asbestos, the Contractor shall immediately inform the Engineer who in turn will notify the Owner. Work that would expose workers to the inhalation of asbestos particles shall be terminated. Work may be resumed only after a determination has been made and unsafe materials have been removed or encapsulated and the area declared safe.

#### 1.9 Coordination Drawings

- A. The Division 23 Contractor shall prepare and be responsible for 0.25inch scale electronic coordination drawings. These drawings shall be produced using a computer aided drafting software of a mutually agreed upon format with the Division 21, 22, 23, 26, 27 and 28

Contractors. Each Contractor shall prepare their own electronic drawings, using common backgrounds obtained from the Architect and Structural Engineer. The Division 23 Contractor shall be responsible for consolidating (merging) the drawings into combined coordination drawings, and lead the conflict resolution process, with all contractors working together to obtain finished coordinated drawings. No work shall be installed until all contractors have approved and signed-off with their approval and drawings have been submitted and reviewed by the Engineer.

- B. Review by the Engineer is cursory. It is the Contractors responsibilities to ensure that all work is coordinated, including fit above ceilings and that specified ceiling heights are maintained.

#### 1.10 Coordination Drawings

- A. Refer to Divisions 00 and 01 for requirements.

#### 1.11 Inspection

- A. All work shall be subject to inspection of Federal, State and local agencies as may be appropriate, and of the Architect and Engineer.
- B. Obtain final inspection certificates and turn over to the Owner.

#### 1.12 Record Drawings

- A. Maintain a separate set of field prints of the contract documents and show all changes or variations, in a manner to be clearly discernible, which are made during construction. Upon completion of the work and within 90 days of system acceptance, these drawings shall be turned over to the Engineer. This shall apply particularly to underground and concealed work, and to other systems where the installation varies to a degree which would justify recording the change.

#### 1.13 Operating and Maintenance Manuals

- A. Assemble electronic copies each of operating and maintenance manuals for the Communications work.
- B. All "approved" shop drawings and installation, maintenance and operating instruction pamphlets or brochures, wiring diagrams, parts list, and other information, along with warranties, shall be obtained from each manufacturer of the principal items of equipment. In addition, prepare and include a chart listing all items of equipment which are furnished under this contract, indicating the nature of maintenance required, the recommended frequency of checking these points and the type of replacement material required. Name and address of a qualified service agency.
- C. Standard NEMA publications on the operation and care of equipment may be furnished in lieu of manufacturer's data where the manufacturer's instructions are not available.
- D. Original purchase order number, date of purchase, name, address, and phone number of the vendor warranty information.
- E. Copy of required test reports.



- F. These shall be assembled into three-ring loose leaf binders or other appropriate binding. An index and tabbed sheets to separate the sections shall be included. These shall be submitted to the Engineer for review. Upon approval, manuals shall be turned over to the Owner.
- G. O&M Manuals shall contain the following information at a minimum:
  - 1. Copies of all approved shop drawings with the Engineer's stamp.
  - 2. Owner's manuals for every item of equipment when available from the manufacturer. These shall be the technical manuals provided by the manufacturer and shall not consist of generic sales brochures. Technical manuals shall provide complete specifications for the equipment as well as complete operating, maintenance, troubleshooting and product repair/replacement information. Where available only in electronic format, the contractor may provide a CD with electronic versions of Owner's manuals. CDs containing electronic versions of Owner's manuals must contain the proper software viewers for each document type.
  - 3. Communications drawings updated with final as-built information. This shall be in the form of a complete set of Communications drawings with as-built information indicated in colored pen based upon actual field conditions.
  - 4. System schematic and block diagrams for every system updated with final as-built information. These drawings shall define the exact arrangement of each system including wiring configuration, device locations and cable types.
  - 5. Rack elevations for all systems with rack mounted equipment.

#### 1.14 Final Inspection and Punch List

- A. As the time of work completion approaches, survey and inspect Division 27 work and develop a punch list to confirm that it is complete and finished. Then notify the Engineer and request that a final inspection be made. It shall not be considered the Architect's or Engineer's obligation to perform a final inspection until the Contractor has inspected the work and so states at the time of the request for the final inspection.
- B. Requests to the Engineer for final inspection may be accompanied by a limited list of known deficiencies in completion, with appropriate explanation and schedule for completing these; this is in the interest of expediting acceptance for beneficial occupancy.
- C. The Architect and/or Engineer will inspect the work and prepare a punch list of items requiring correction, completion or verification. Corrective action shall be taken by the Contractor to the satisfaction of Architect and Engineer within 30 days of receipt of the Architect/Engineer's punch list.

#### 1.15 Warranty

- A. Warrant all workmanship, equipment and material entering into this contract for a period of one (1) year **or the period of time as per specific specification section**, from date of final acceptance or date of beneficial use, as agreed to between Contractor and Engineer. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. The use of equipment for temporary communication systems is not the start of the warranty period.
- B. This provision is intended specifically to cover deficiencies in contract completion or performance which are not immediately discovered after systems are placed in operation. These items include, but are not limited to replacement of malfunctioning equipment and adjusting special equipment and communication systems to obtain optimum performance.

- C. This provision shall not be construed to include maintenance items such as making normally anticipated adjustments or correcting adjustment errors on the part of the Owner's personnel.
- D. Provisions of this warranty shall be considered supplementary to warranty provisions under Division 01 General Conditions.

#### 1.16 Software Support Agreement

- A. Provide a software support agreement (SSA) with the project for each system with user software, that covers the entirety of the systems including all end devices, servers, etc. as part of the completed system for a period of not less than 1 year. Agreement shall cover software upgrades, system patches and firmware releases and all labor/material to implement at no additional cost to the owner.
- B. The SSA shall commence at the completion of the project after final inspection, system demonstration and system training.
- C. Provide a copy of the SSA including start and end dates, and a descriptive narrative of what is included with the close-out documents.

### **PART 2 - PRODUCTS**

#### 2.1 Materials and Equipment

- A. Materials and equipment furnished shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more articles of the same material or equipment are required, they shall be of the same manufacturer.
- B. All electronic equipment provided under this scope of work shall be of a make/model that is currently in production at the time of installation.
- C. All electrical equipment and wiring shall bear the Underwriters Laboratories, Inc. label where UL labeled items are available, and shall comply with NEC (NFPA-70) and NFPA requirements.

#### 2.2 Reference Standards

- A. Where standards (NFPA, NEC, EIA/TIA, ASTM, UL, etc.) are referenced in the specifications or on the drawings, the latest edition is to be used except, however, where the Authority Having Jurisdiction has not yet adopted the latest edition, the edition so recognized shall be used.

#### 2.3 Equipment Selection

- A. The selection of materials and equipment to be furnished shall be governed by the following:
  - 1. Where trade names, brands, or manufacturers of equipment or materials are listed in the specification, the exact equipment listed shall be furnished. Where more than one name is used, the Contractor shall have the option of selecting between any one of the several specified. All products shall be first quality line of manufacturers listed.
  - 2. Where the words "or approved equal" appear after a manufacturer's name, specific approval must be obtained from the Engineer during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.

3. Where the words "equal to" appear, followed by a manufacturer's name and sometimes a model or series designation, such designation is intended to establish quality level and standard features. Equal equipment by other manufacturers will be acceptable, subject to the Engineer's approval.
- B. Substitute equipment of equal quality and capacity will be considered when the listing of such is included as a separate item of the bid. State the deduction or addition in cost to that of the specified product.
- C. Before bidding equipment, and again in the preparation of shop drawings, verify that adequate space is available for entry and installation of the item of equipment, including associated accessories. Also verify that adequate space is available for servicing of the equipment and that required NEC clearances are met.
- D. If extensive changes in conduit, equipment layout or electrical wiring and equipment are brought about by the use of equipment which is not compatible with the layout shown on the drawings, necessary changes shall be deemed to be included in this contract.

#### 2.4 Shop Drawings

- A. Electronic copies of shop drawings and descriptive information of equipment and materials shall be furnished. Submit to the Architect and/or Engineer for review as stated in the General Conditions and Supplementary Conditions. These shall be submitted as soon as practicable and before equipment is installed and before special equipment is manufactured. Submittal information shall clearly identify the manufacturer, specific model number, approval labels, performance data, pump curves, electrical characteristics, features, specified options and additional information sufficient to evidence compliance with the contract documents. Product catalogs, brochures, etc. submitted without project specific items marked as being submitted for review will be rejected and returned without review. Shop drawings for equipment, fixtures, devices and materials shall be labeled and identified same as on the Contract Documents. If compliance with the above criteria is not provided shop drawings will be subject to rejection and returned without review. Samples shall be submitted when requested or as specified here with-in.
- B. The review of shop drawings by the Architect or Engineer shall not relieve the Contractor from responsibility for errors in the shop drawings. Deviations from specifications and drawing requirements shall be called to the Engineer's attention in a separate clearly stated notification at the time of submittal for the Engineer's review.
- C. Electronic format – Shop drawings may be submitted in electronic format utilizing PDF files. The submittal shall be organized by specification section and contain all required information within a PDF document for each specification section. The submittal shall be organized as follows:
  1. Primary zip file contains a PDF of master transmittal cover page indicating the project name, submitting contractor, contact information and a list of all the sections with titles being submitted. This primary file shall also contain each of the individual PDF files for the individual sections being submitted.
  2. Sub PDF file for each specification section organized as follows:
    - a. First page - Cover page indicating the project name, submitting contractor, contact information, space for Engineer's stamp.
    - b. Page(s) for contractor qualifications and project certifications.
    - c. Page(s) for Bill of Materials (BOM) list including part numbers, quantities and references to specification section paragraphs for each part.

- d. Page(s) for manufacturer's data sheets.
  - e. Page(s)/Drawing(s) for system diagrams, riser diagrams, block diagrams, etc.
  - f. Drawing(s) for floor plans showing equipment locations.
- D. Refer to individual system specifications for submittal requirements. At a minimum, shop drawings shall contain the following information:
- 1. A complete list of materials with model and part numbers and reference to the Part 2 specification paragraph number.
  - 2. Shop drawings including manufacturer's product and cable data sheets specific to the project. Data sheets shall indicate exact model numbers and options specific to the project.
  - 3. Floor plans showing location of all items of equipment. Drawings shall also indicate each location where 120 power is required.
  - 4. Job specific schematic and point to point wiring diagrams showing all devices, number and size of wires, etc.
  - 5. Contractor qualifications and/or Manufacturer's Certifications where specifically specified.
  - 6. System software information, where applicable showing features, version, hardware requirements, and any other information required to ascertain conformance with specifications.
- E. Equipment that does not fully comply with the specifications and which has not had this information presented in the shop drawing phase and approved, will be removed and replaced with specification compliant equipment at the contractor's expense.
- F. Any shop drawings that do not contain the minimum required information outlined herein and as specified elsewhere shall be considered incomplete and will not be reviewed. It is the contractor's responsibility to fully read and understand all requirements for submittals for each section and to carefully and completely adhere to all requirements.

## 2.5 Computer Workstations

- A. All computer workstations provided under this contract shall utilize the same manufacturers chipsets, hardware and peripherals. All processors shall be either Intel or AMD. It shall also be required to provide the same manufacturer for monitors, keyboards, mice, video cards, etc. Refer to specs in each section for specific requirements such as processor speed and base memory.
- B. All computer workstations provided under this contract shall be equipped with fully licensed, automated, active anti-virus software. Approved anti-virus software packages shall be as produced by Norton, McAfee or Symantec.
- C. All computer workstations provided under this contract shall be provided with a minimum of USB 2.0 and 3.0 ports, and 1000BASET network port.

## 2.6 Network Enabled Devices with username/password

- A. All devices which include a username/password shall be set by the contractor during construction as directed by the owner.
- B. Devices shall not be left at default unless specifically directed by the owner.
- C. Turn over a spreadsheet with all devices including device description, MAC address, IP address (if static) username and password.

### **PART 3 - EXECUTION**

#### **3.1 Testing**

- A. As each wiring system is completed, it shall be tested for continuity and freedom from grounds.
- B. As each electrically operated system is energized, it shall be tested for function.
- C. The Contractor shall perform megger and resistance tests and special tests on any circuits or equipment when an authorized inspection agency suspects the system's integrity or when requested by the Architect or Engineer.
- D. All signaling and communications systems shall be inspected and tested by a qualified representative of the manufacturer or equipment vendor. Refer to specific sections for required testing of the various systems. Submit four (4) copies of reports indicating results.
- E. Tests shall be witnessed by field representatives of the Architect or Engineer or shall be monitored by a recorder. Furnish a written record of each system test indicating date, system, test conditions, duration and results of tests. Copies of all test reports shall be included in the O&M manuals.
- F. Instruments required for tests shall be furnished by the Contractor.

#### **3.2 Equipment Cleaning**

- A. Before placing each system in operation, the equipment shall be thoroughly cleaned; cleaning shall be performed in accordance with equipment manufacturer's recommendations.
- B. Refer to appropriate Sections for cleaning of other equipment and systems for normal operation.

#### **3.3 Operation and Adjustment of Equipment**

- A. As each system is put into operation, all items of equipment included therein shall be adjusted to proper working order. This shall include balancing and adjusting voltages and currents; verifying phase rotation; setting breakers, ground fault and other relays, controllers, meters and timers; and adjusting all operating equipment.

#### **3.4 Operating Demonstration and Instructions**

- A. Set the various systems into operation and demonstrate to the Owner and Engineer that the systems function properly and that the requirements of the Contract are fulfilled.
- B. Provide the Owner's representatives with detailed explanations of operation and maintenance of equipment and systems. A thorough review of the operating and maintenance manuals shall be included in these instructional meetings.
- C. O & M Manuals shall be submitted, reviewed and approved prior to scheduling of demonstrations.
- D. A minimum of 48 hours shall be allowed for instruction to personnel selected by the Owner. Instructions shall include not less than the following:

1. Show location of items of equipment and their purpose.
  2. Review binder containing instructions and equipment and systems data.
  3. Coordinate written and verbal instructions so that each is understood by personnel.
  4. Manufacturer's representatives for the various special and communication systems shall give separate instructions.
  5. All operating demonstrations and instructions for each system shall be audio/video digitally recorded and turned over to the Owner.
- E. A minimum of 48 hours continuous trouble-free operating time shall be acceptable to prove that the systems function properly.
- F. Note that additional time for training, operating time, etc. may be required per other specification sections and shall be included. This section only establishes minimum requirements.

END OF SECTION

**27 05 04 BASIC COMMUNICATIONS MATERIALS AND METHODS**

**PART 1 - GENERAL**

- 1.1 Refer to Section 26 05 04 Basic Electrical Materials and Methods which are hereby made part of Division 27 - Communications.
- 1.2 Temporary Telecommunication Services
- A. The temporary communications for construction is provided by the Contractor. Refer to Division 01 – General Requirements.
  - B. The use of the permanent telecommunication system for temporary services during the latter stages of construction shall be allowed. Expedite completion of system as practicable to this end. Maintain the system during this period.
  - C. Warranty periods on equipment, materials and systems shall commence upon Owner acceptance of the building or systems. Temporary use shall not jeopardize or alter warranty requirements.
  - D. The complete temporary service shall comply with Telephone Company, Owner Facility, OSHA and all Code requirements.
- 1.3 Continuity of Service
- A. Work shall be so planned and executed as to provide reasonable continuous service of existing systems throughout the construction period. Where necessary to disrupt services for short periods of time for connection, alteration or switch over, the Owner shall be notified in advance and outages scheduled at the Owner's reasonable convenience.
  - B. Submit, on request, a written step-by-step sequence of operations proposed to accomplish the work. The outline must include tentative dates, times of day for disruption, downtime and restoration of services. Submit the outline sufficiently in advance of the proposed work to allow the Architect or Engineer to review the information with the Owner. Upon approval, final planning and the work shall be done in close coordination with the Owner.
  - C. Shutdown of systems and work undertaken during shutdown shall be bid as being done outside of normal working hours.
- 1.4 Work Restrictions
- A. Planning & Construction will request keys be made available to Contractor's Project Manager to check out at the police office. Keys must be returned to the Police office prior to leaving campus. This does not authorize contractors access into any other space on campus without specific advance approval of Planning & Construction. If your key does not allow access to a space, coordinate with Planning & Construction for access to that area.
  - B. Escorts are needed for non-Sinclair personnel in selected areas. P&C keeps a list of these areas; however, the Police may require escorts in other areas on a case-by-case basis.
  - C. During times that the college is not normally open, all personnel are required to enter and leave the Dayton campus via the police entrance (east side of Building 7). All other exterior doors are alarmed with Access Control hardware and must remain closed and locked at all times.

- D. The parking garage has no gates or method to collect payment for parking. The only designated contractor parking is in lot F south of the railroad tracks on Longworth Street.
- E. SCC Smoking/Tobacco policy - <http://www.sinclair.edu/services/conduct-safety/public-safety/education-and-awareness/tobacco-and-tobacco-related-products-restrictions-policy/>
- F. Driving on areas other than driveways must be coordinated with P&C in advance.
- G. Any work that may disturb classes or staff should be arranged for a time the room or area in question is not in use. All work above ceilings in occupied and public spaces shall be performed after normal working hours.
- H. No weapons are allowed on campus.

#### 1.5 JOB CONDITIONS

- A. Keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the System integrator, maintain the same individual in charge throughout the project.
- B. Cooperate with all appropriate parties in order to achieve well-coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. Watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. Immediately report to the Sinclair Multimedia System Engineer any design or installation irregularities, particularly architectural elements that interfere with the intended coverage angles of loudspeakers and projectors, so that appropriate action may be taken.
- E. Verify with the College to disconnect and remove, and return the technology equipment currently installed in the room.
- F. Do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation.
- G. The System integrator will be responsible for the daily removal of all debris generated during the life of the project. The contractor(s) are responsible for providing their own trash receptacles, SCC receptacles or facilities shall not be utilized.
- H. In all areas that will be occupied and requiring evening hours work the System integrator shall ensure these areas are clean and ready for use no later than 6:30 am each workday
- I. Coordinate with the College for project schedule. Project may mandate 3rd shift work.
- J. Parking is at the System integrator's expense, there is no designated contractor parking available on SCC Campus. You may park daily in the Student/Visitor Parking Garage Lot A or on the street at metered parking. Planning and Construction will issue a permit for one company vehicle to park in designated areas for delivery of materials and tools; however this vehicle must be company marked.

#### 1.6 QUALITY ASSURANCE



- A. Procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. Conform in all trades with all local regulations and codes.
- B. Comply with federal, state and local labor regulations and applicable union regulations. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and Drawings and Specifications.
- C. Comply with Best Practices and standards for the installation and wiring of technology integrated systems as set forth by ICIA.
- D. All provided materials shall be new and shall conform to applicable provisions of Underwriters Laboratories and the American Standards Association.
- E. The Project Manager and Installers shall be ICIA CTS certified at a minimum. The same personnel shall see the project through its entirety.
- F. The System integrator will be required to have a certified Crestron Programmer assigned to this project, and performing the programming. The Same programmer shall see the project through its entirety.

## **PART 2 - PRODUCTS**

### 2.1 Access Panels

- A. Provide ceiling and wall access panels where indicated on the drawings, or where otherwise required to gain access to concealed junction boxes, pull boxes, devices and equipment requiring service or adjustment.
- B. Access panels (refer to paragraph C. below for more specialized drywall ceiling access panels) shall be steel construction (except where aluminum or stainless steel is specified) with concealed hinge and door with tamperproof screws. Locks in "secured" areas of the building shall have tamperproof screws / be institutional grade locksets. Panels shall be 18 inch x 18 inch size unless larger panels are shown or required. Mounting frames shall be compatible with the material in which they are installed. Access panels shall be:
  - 1. Standard flush type with overlapping flange for masonry and tile walls.
  - 2. Plaster ceilings use style "AP". Recessed type having the door recessed to accept a drywall panel insert, for drywall ceilings and walls, Milcor style "ATR" or equal.
  - 3. Standard flush type for drywall ceilings and walls, Milcor style "M" or equal.
- C. Access panels in drywall ceilings shall be glass reinforced gypsum drywall lay-in panels with flush mounting frames. Corners of panels shall be rounded. Panels shall be 18 inches x 18 inches unless larger panels are shown or required.
- D. Access panels in fire rated shaft walls and in fire rated ceilings shall be "B" label or greater to match the rating of the wall or ceiling.
- E. Materials used in plenums shall be rated for plenum use conforming to the ASTM E84 25/50 smoke development and flame spread restrictions.

## **PART 3 - EXECUTION**

### 3.1 Workmanship

- A. Materials and equipment shall be installed and supported in a first-class and workmanlike manner by mechanics skilled in their particular trades. Workmanship shall be first-class in all respects, and the Architect and Engineer shall have the right to stop the work if highest quality workmanship is not maintained.
- B. Electrical work shall be performed by a licensed Contractor in accordance with requirements of the jurisdiction.
- C. Communication work shall be performed by certified Contractor in accordance with the respective specification and system requirements.

### 3.2 Protection

- A. The Contractor shall be entirely responsible for all material and equipment furnished in connection with his work. Special care shall be taken to properly protect all parts thereof from theft, damage or deterioration during the entire construction period in such a manner as may be necessary, or as directed by the Architect.
- B. The Owner's property and the property of other contractors shall be scrupulously respected at all times. Provide drop cloths and visqueen or similar barriers where dust and debris is generated, to protect adjacent areas.

### 3.3 Cutting and Patching

- A. Refer to Division 01 - General Requirements for information regarding cutting and patching.
- B. Plan the work well ahead of the general construction. Where conduits, wireways and cable trays are to pass thru new walls, partitions, floors, roof or ceilings, place sleeves in these elements or arrange with the General Contractor to provide openings where sleeves are not practical. Where sleeves or openings have not been installed, cut holes and patch as required for the installation of this work, or pay other trades for doing this work when so directed by the Architect. Any damage caused to the building shall be repaired or rectified.
- C. Where conduits, wireways and cable trays are to pass thru, above or behind existing walls, partitions, floors, roof or ceiling, cutting, patching, refinishing and painting of same shall be included in this contract. Core drilling and saw cutting shall be utilized where practical. Contractor to examine where floors and walls, etc. are to be cut for presence of existing utilities.
- D. When cutting or core-drilling floor verify location of existing electrical, plumbing or steel reinforcement. Use X-ray method to verify existence of obstructions. Either re-route existing system brace floor or alter location of new work to maintain existing system.
- E. All sleeves and openings not used or partially used shall be closed to prevent passage of fire or smoke.
- F. All materials, methods and procedures used in patching and refinishing shall be in accordance with applicable provisions of specifications governing the various trades, and shall be completed by skilled workmen normally engaged in these trades. The final appearance and integrity of the patched and refinished areas must meet the approval of the Architect. Wall, floor and ceiling refinishing must extend to logical termination lines (entire ceiling of the room repainted, for instance), if an acceptable appearance cannot be attained by finishing a partial area.

- G. Provide steel angle or channel lintels to span openings which are cut in existing jointed masonry walls where the opening span exceeds 16 inches. Provide framing around roof openings for required support of the roof deck.
- H. Engage a Roofing Contractor on a subcontract basis for roofing and roof insulation work necessitated by the Communications work. The Roofing Sub-Contractor shall be certified for installation and repair of the roofing system so as to maintain the existing roofing warranty.

### 3.4 Removals, Alterations and Reuse

- A. Refer to the drawings for the scope of remodeling in the existing building.
- B. Cooperate with the General Contractor regarding all removal and remodeling work. The Contractor shall remove existing work which is associated with his trade, and which will be superfluous when the new system is installed and made operational. Void unused conduit behind walls or below floors as necessary or as directed. No wire or conduit shall be removed which will impair the functioning of the remaining work unless first replaced with a rerouted section of wire or conduit to ensure continuity. Remove inactive wiring back to the last active junction box, panelboard or piece of equipment.
- C. Upon completion, no unused conduit or stub shall extend thru floors, walls or ceilings in finished areas. Abandoned conduit where remaining in place shall have any unused wiring removed. All accessible unused conduit shall be removed.
- D. When it is necessary to reroute a section of an active circuit, the rerouted section shall be installed before removing the existing in order to minimize system down time. Rerouted sections shall be installed as required for new work.
- E. Materials and equipment which are removed shall not be reused within the scope of this project unless specifically noted to be relocated or reused. Turn over to the Owner and place where directed on the premises all removed material and equipment so designated by the Owner. All material and equipment not claimed by the Owner shall become the property of the Contractor responsible for removal and shall be removed from the premises.
- F. Remove, store and reinstall lay-in ceiling tile and grid as needed to perform work in areas where such removal and re-installation is not to be done by the General Contractor. Damaged tile and/or grid shall be replaced with new matching tile and/or grid.
- G. In areas of minor work where the space is not completely vacated, temporarily move portable equipment and furnishings within the space as required to complete the work. Coordinate this activity with Owner. Protect the Owner's property by providing dust covers and temporary plastic film barriers to contain dust. Remove barriers and return equipment and furniture upon completion of the work.
- H. Refinish any surface disturbed under this work to match existing, except where refinishing of that surface is included under another Contract.

### 3.5 Painting

- A. In addition to any painting specified for various individual items of equipment, the following painting shall be included in Division 27:
  - 1. Ferrous metal which is not factory or shop painted or galvanized and which remains exposed to view in the building including finished areas, mechanical rooms, storage

- rooms, and other unfinished areas shall be given a prime coat of paint and two finish coats of paint.
2. Ferrous metal installed outside the building which is not factory or shop painted or galvanized shall be given a prime coat of paint and two finish coats of paint.
  3. Equipment and materials which have been factory or shop coated (prime or finished painted or galvanized), on which the finish has been damaged or has deteriorated, shall be cleaned and refinished equal to its original condition. The entire surface shall be repainted if a uniform appearance cannot be accomplished by touch up.
  4. Apply Z.R.C. Galviline cold galvanizing compound, or approved equal, for touch-up and repair of previously galvanized surfaces.
  5. Each backboard shall be painted with a minimum of two coats of flame retardant paint, all sides; gray enamel primer with gray matte enamel finish.
- B. Paint, surface preparation and application shall conform to applicable portions of the Painting section of Division 09 of the Specifications. All rust must be removed before application of paint.
- C. Finish painting is included in the General Contract except where otherwise required under remodeling work. Refer to the Cutting and Patching paragraph in this Section for finishing requirements.

### 3.6 Access Panels

- A. Install access panels or pay general trade to do so. Final appearance is subject to approval by the Architect or Engineer.
- B. Location of access panels shall be planned to clear ceiling lights, ceiling support grids and other obstructions so as to allow, wherever possible, full shoulder clearance beside the device to be inspected, adjusted or repaired.
- C. Panels with recessed doors are to be fitted with insert panels of drywall or, those for plaster, infilled with plaster. Caution the Installing Contractor to provide appropriate framing with drywall or plaster beading to ensure a finished appearance. Shim strips may be required to bring the insert panel flush with the plane of the door and wall / ceiling.

END OF SECTION

**27 05 05 FIRESTOPPING**

**PART 1 - GENERAL**

- 1.1 Firestopping assemblies shall be provided at penetrations of conduits, bus ducts, cables, cable trays and other electrical items thru fire rated floors, fire rated floor-ceiling and roof ceiling assemblies, fire rated walls and partitions and fire rated shaft walls and partitions. In addition, firestopping assemblies shall be provided at penetrations thru 0-hour rated floors. Refer to the drawings for fire rated building elements.
- 1.2 All existing penetrations which have firestopping which are disturbed as part of this project, shall have the existing firestop restored to its UL listed approved condition.
- 1.3 Firestopping assemblies shall be tested and rated in accordance with ASTM E814, E119 and listed in accordance with UL 1479, as published in the UL Fire Resistance Directory. Firestopping shall provide a fire rating equal to that of the construction being penetrated.
- 1.4 Firestopping materials, assemblies and installation shall conform to requirements of the OBC / Chapter 1, Section 106 and Chapter 7, Section 712 and the Authority Having Jurisdiction.
- 1.5 For those firestopping applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.6 Shop drawings shall be prepared and submitted for review and approval. Submittals shall include manufacturer's specifications and technical data of each material, documentation of U.L. firestopping assemblies and installation instructions. Submittals shall include all information required in OBC Chapter 1, Section 106 and Chapter 7, Section 712.

**PART 2 - PRODUCTS**

- 2.1 Firestopping materials shall be manufactured and/or supplied by Hilti, 3M, Rectorseal-Metacaulk, Tremco, Nelson, Specified Technologies or other approved manufacturer.
- 2.2 Materials shall be in the form of caulk, putty, sealant, intumescent material, wrap strip, fire blocking, ceramic wool and other materials required for the UL listed assemblies. These shall be installed in conjunction with sleeves and materials for fill and damming.
- 2.3 Combination pre-set floor sleeve and firestopping assemblies shall be equal to Hilti CP 680.

**PART 3 - EXECUTION**

- 3.1 Installation of all materials and assemblies shall be in accordance with UL assembly drawings and the manufacturer's instructions.
- 3.2 Installation shall be done by an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary training and experience.

END OF SECTION



**27 15 13      COMMUNICATIONS COPPER HORIZONTAL CABLING**

**PART 1 – GENERAL**

1.1      Summary

- A.      Work will consist of a complete Structured Wiring System that includes: Category 6 horizontal cabling, jacks and faceplates, IDC connecting hardware, open equipment racks, identification and testing.
- B.      CommScope has been adopted as the acceptable manufacturer for the Sinclair Community College campus. Contact Bob Stewart at 800-982-1708 for a complete list of qualified contractors.
- C.      Work shall be installed to meet the Telecommunications Building Wiring Standard ANSI/TIA/EIA 568, 569, 570, 606, 607, TSB 67, TSB 72, TSB 75 and NEC Article 800.

1.2      Acceptable Systems Manufacturers/Products

- A.      Systimax Solutions has been adopted as the acceptable manufacturer for the Sinclair Community College campus.
- B.      The citing of Systimax Solutions is accomplished to continue the standard of quality and performance Sinclair Community College expects and to expand the campus-wide uniform communications platform that has been established.
- C.      To establish comparative standards of quality, the system indicated herein shall be represented by an authorized, certified Systimax Solutions contractor. **Contact Bob Stewart at 800-982-1708 for a complete list of qualified contractors.**

1.3      Contractor Qualifications

- A.      Be an authorized dealer/service organization for all major items of electronic equipment furnished.
- B.      Employ, on a full-time basis, an InfocommCTS-D qualified audio/electronics Engineer under whose direction and supervision the entire installation shall be carried out.
- C.      Employ, on a full-time basis, trained technician(s) who are experienced in the installation of sound reinforcement equipment, its interconnector and setup. Lead technician for entirety of project shall be CTS-I certified.
- D.      System Contractors shall have a “Certified Crestron Programmer” on staff. The Contractor shall provide a copy of the certificate bearing the name of the programmer. The same certified programmer shall work on the project in its entirety.
- E.      Employ, on a full-time basis, a RCDD (BICSI certified) Engineer under whose direction and supervision the entire installation shall be carried out.

1.4      Submittals

- A. Product Data Sheets
  - 1) See specific product information in Part 2-Products.
- B. Pre-qualification Training Certificates.
  - 1) Training certificates for design, engineering and installation of proposed products **shall be submitted with contractor's bid.**
  - 2) Training certificates shall provide date of certification and level of qualification.

1.5 Quality Assurance

- A. All equipment and components provided by the contractor shall be new and shall meet or exceed the latest published specifications of the manufacturer in all respects.
- B. The contractor shall maintain the same person in charge of work throughout the installation and testing phases.
- C. The contractor shall provide and install any incidental equipment needed in order to complete and have an operable system even in not specified or shown on drawings without claim for additional payment.
- D. The contractor shall confirm the correctness of parts list and equipment model numbers and conformance of each component with manufacturer's specifications.

1.6 Project Conditions

- A. The contractor shall have a complete set of drawings and project specifications at the job site at all times during installation.
- B. The contractor shall be held responsible for coordination of their work with other trades in a timely and professional manner.
- C. The contractor is responsible for protection of their work from acts of vandalism and environmental conditions.
- D. The contractor is responsible for maintaining a clean work area.
- E. The contractor shall provide a sufficient labor force to keep pace with other trades. The owner reserves the rights to require an increase in labor force or overtime work without additional expense to the owner if the installation lags behind other trades to the detriment of the construction.
- F. The contractor shall abide by the decision of the Engineer and /or the Owner in case of conflict or interference by other trades.

1.7 Warranty

- A. Twenty (20) year Extended Product Warranty and System Assurance Warranty for the Structured Wiring System shall be provided to the owner.



- B. The Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of TIA/EIA 568A and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for cabling links/channels, that the installation shall exceed the loss and bandwidth requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for fiber links/channels, for a twenty (20) year period.
  - C. The System Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional applications introduced in the future by recognized standards or user forums that use the TIA/EIA 568A or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a Twenty (20) year period.
  - D. The Extended Product Warranty and the System Assurance shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.
  - E. Upon successful completion of the installation and subsequent inspection, the customer shall be provided an Avaya Communications SCS Assurance Warranty naming the site and installed components.
- 1.8 The Extended Product Warranty and the System Assurance shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.
- 1.9 Upon successful completion of the installation and subsequent inspection, the customer shall be provided a Avaya Communications SCS Assurance Warranty naming the site and installed components. Grounding And Bonding
- A. Communication grounding and bonding shall be in accordance with the NEC 1999, NFPA, TIA/EIA 607 and all local codes that specify additional grounding and/or bonding requirements.

## **PART 2 – PRODUCTS**

- 2.1 Data Horizontal Category 6 (Data Station, CCTV Station) Cables, Connectors, And Hardware
- A. Data Horizontal cables shall be Systimax 2071EBL 4/23/1000.
  - B. Data information outlets at the workstation end shall be Systimax MGS400BH-318 (blue).
  - C. Data patch panels shall be SYSTIMAX 360™ GigaSPEED XL® Evolve flat Category 6 U/UTP Patch Panel, 24 and 48 port.
  - D. Provide (Qty. 1) Systimax GS8E-5 (blue) patch cord per information outlet to Sinclair Community College
    - 1) Patch cables shall be provided in bulk without individual wrapping for each cable.
    - 2) Final cable sizes and quantities to be coordinated with SCC prior to ordering.

- E. Provide (Qty. 1) Systimax D8CM-14 (blue) patch cord per information outlet to Sinclair Community College.
  - 1) Patch cables shall be provided in bulk without individual wrapping for each cable.
  - 2) Final cable sizes and quantities to be coordinated with SCC prior to ordering.

## 2.2 Video Distribution Cables, Connectors, And Hardware

- A. Video horizontal cables shall be Commscope UN874017904/10 F/UTP, cable shall be orange in color
- B. Video Cable connectors shall be etherCON CAT 6 NE8MC6-MO
- C. Video Cable outlets at the faceplate end shall be etherCON CAT 6 NE8FDY-C6, coordinate housing color with Owner
- D. Video cable patch cables shall be etherCON NKE6S-\*. Contractor shall coordinate termination requirements of patch cables with Owner and exact equipment requirements.

## 2.3 Workstation Faceplates

- A. Workstation faceplates that will house Voice, Data and Tartan cables shall be Systimax ML Series. Install dust covers for all unused outlets.
- B. Workstation outlets that are being provided in Floor Boxes, provide Systimax modular mounting straps compatible with floor box system for installation of up to six (6) workstation jacks. Install blank inserts on all unused jack ports.

## 2.4 Labels

- A. Acceptable Products
  - 1) Faceplate Identification (cables) – Brady LAT-26-747
  - 2) Faceplate Identification (windows) – Brady LAT-176-124WT
  - 3) Cable Identification – Brady LAT-17-361-1

## **PART 3 - EXECUTION**

### 3.1 Wiring Methods

- A. The conduit and cable tray system is indicated on the prints, and is being provided under a separate contract. Use cable tray, J-Hooks and/or conduit/wiremold to support all horizontal cables according to TIA/EIA.
- B. Voice and data station cable shall not exceed the EIA/TIA maximum lengths for the specified Category rating. The contractor shall be responsible for verifying adequate cable pathways to limit cable lengths prior to installation. Where existing or designed

pathways do not allow for compliance to distance limitations for voice and data cabling, the contractor shall provide alternate pathway routes to the Engineer for review.

- C. Interior - All voice/data/CATV station cables shall be run in conduit to local TR as indicated on drawings and specifications. All cabling shall be run parallel or perpendicular to building lines.
- D. The drawings are not intended to represent scaled and dimensioned routes for telecommunications cables. The Telecommunications Contractor is responsible for developing all cabling routes utilizing new conduit systems and existing conduit risers, so that all structured cabling adhere to specific codes and standards specifically developed for the installation of such cables. Where the use of new cable pathways would cause the structured cable system to violate specific codes and standards regarding cable lengths, environments, proximity to EMI and RF noise sources, etc, the Telecommunications Contractor shall be responsible for developing alternative pathways and shall include all labor and material for doing so within the scope of this work.
- E. Cable pathways shall provide the following minimum clearances (parallel or perpendicular):
  - 1) Motors and transformers – 48”
  - 2) Conduit and cable used for electrical power distribution – 12”
  - 3) Fluorescent lighting – 5”
  - 4) Power lines up to 2kVA – 5”
  - 5) Power lines over 5kVA – 24”
  - 6) Hot water/steam lines - Bare –18”, Insulated – 6”
- F. Each voice and data jack shall be wired with a dedicated home run. Each voice and data jack shall be identified. The jacks shall be labeled on the faceplate. Station cables shall be labeled at TC termination point with corresponding workstation outlet jack number.
- G. Voice and data cables shall be handled and installed with extreme care. Twisted pairs shall be untwisted less than .5 inch at terminations for Cat, 5e, Cat. 6. Tie wraps shall loosely hold cables; do not overtighten. Cables shall have sweeping bends and shall have a maximum bending radius at any point in the installation of not less than 4 times the outer diameter of the cable. The cable manufacturer’s recommended bending radius and maximum pulling tensions shall be strictly adhered and shall not be exceeded. Failure to comply will result in the removal and replacement of affected cable at no additional cost to the Owner.
- H. Voice and data horizontal station cable shall not exceed the EIA/TIA guidelines for LINK distances. The permanent LINK shall be as defined in the EIA/TIA standards as the distance from the workstation outlet jack to the TC termination equipment patch panel/cross-connect port.

- I. Provide adequate cable slack at each workstation outlet and the IDF/MDF termination equipment as follows:
  - 1) Workstation outlet
    - a) 12" of copper cable slack.
- J. Where cables are installed in conduit, the conduit system shall conform to the following:
  - 1) No section of conduit shall be longer than 100 feet between pulling points.
  - 2) No more than two 90 deg. Bends in a section of conduit between pulling points.
  - 3) Each section of conduit shall be labeled for length, destination closet and origination closet.
  - 4) Refer to EIA/TIA 569-A for specific conduit and pull box requirements.

### 3.2 Testing

- A. The Contractor shall be responsible for testing all installed Structured cables including:
  - 1) Voice and data station
- B. **No testing shall be executed until the entire system has had the Owner approved labeling scheme applied and accepted. All final test reports shall utilize the field installed labels at each outlet for the test of the corresponding outlet. Test reports which contain temporary generic or incorrect labels will not be accepted.**
- C. The Contractor shall be responsible for testing all installed data station cables.
- D. Tests shall be witnessed by Engineer / Owner and shall be monitored by a recorder.
- E. System testing shall be performed with final test results turned over to the Owner prior to acceptance of the system. Missing or incomplete test results will not be reviewed and the system will not be commissioned by the Owner / Engineer.
- F. The Owner / Engineer reserve the right to spot test 5% of the installed cabling plant to verify documented test results. Where the Owner / Engineer have determined that the installed cable plant does not agree with the documented test results, the contractor shall be responsible for re-testing the installed voice/data/fiber cabling plant and revising/updating all test documentation as required.
- G. Instruments required for tests shall be furnished by the Contractor.
- H. All horizontal station cables shall be tested and certified as "Link test" to meet TIA/EIA TSB67 and TSB95 specifications. Utilize Fluke DSP4000 or approved equal.
- I. All Single-Mode fiber optic strands shall be tested at 1310 nm and 1550 nm wavelengths in accordance with ANSI/TIA/EIA-568A, Annex H and 526-7, method 1.

- J. All Multi-Mode fiber optic strands shall be tested at 850 nm and 1300 nm wavelengths in accordance with ANSI/TIA/EIA-568A, Annex H and 526-14, method 1.
- K.
- L. Provide complete test results to Sinclair Community College in hard copy and in electronic format.

### 3.3 Labeling

- A. All cables on termination hardware shall be properly labeled in accordance to TIA/EIA 606 with a mechanical labeler. No handwritten labels will be accepted.
- B. All telecommunication outlets will be labeled with a code indicating room number and the outlet number.
  - 1) Example: Room 13110 has five (5) telecommunications outlets, the location closest to the door on the left will be "01", and each consecutive outlet will be numbered clockwise back to the door. (13110-01, 13110-02, 13110-03, 13110-04, 13110-05 ).
- C. All horizontal cables will have an alpha numeric letter indicating number in the faceplate.
  - 1) Cable "one" —A
  - 2) Cable "two"—B
  - 3) Cable "three"—C

### 3.4 Warranty

- A. Twenty (20) year Extended Product Warranty and System Assurance Warranty for the Structured Wiring System shall be provided to the owner.
- B. The Extended Product Warranty shall ensure against product defects, that all approved cabling components exceed the specifications of TIA/EIA 568A and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for cabling links/channels, that the installation shall exceed the loss and bandwidth requirements of TIA/EIA TSB 67 and ISO/IEC IS 11801 for fiber links/channels, for a twenty (20) year period.
- C. The System Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional applications introduced in the future by recognized standards or user forums that use the TIA/EIA 568A or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a Twenty (20) year period.
- D. The Extended Product Warranty and the System Assurance shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

- E. Upon successful completion of the installation and subsequent inspection, the customer shall be provided a Systimax SCS Assurance Warranty naming the site and installed components.

3.5 Record Information

- A. Upon completion of the installation, contractor shall furnish three (3) complete sets of As-Built drawings showing cable routes, termination locations and outlets and completed test reports in hard copy and electronic (.DWG) files to the Owner.

END OF SECTION

**27 41 16 INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT**

**PART 1 - GENERAL**

1.1 Scope

- A. The work described by this section includes the furnishing of all components, materials, equipment, installation and technical labor and the performance of all operations necessary for the complete installation of an audio-visual system in operating condition as indicated on the drawings and/or specified herein.
- B. In general, the conduit and/or cable tray, junction boxes, electrical power circuits and outlets and terminal cabinets, as required for a complete operating system, shall be furnished and installed by the Electrical Contractor under a separate contract. The entire responsibility for the system, its installation, operation and function shall be that of the Systems Contractor.

1.2 Description of Work

- A. Work consists of new A/V Systems as detailed on the drawings and specified herein.
- B. A/V Distribution Systems are required to be complete with sources, inputs, displays, distribution, controls and connection to the data network/broadband video distribution system as detailed on the drawings and specified herein.
- C. All material and/or equipment necessary for proper operation of the system(s), not specified or described herein, shall be deemed part of these specifications.

1.3 Control Software:

- A. The Contractor shall provide complete programming of the integrated audio/visual system as closely coordinated with the Owner under the Contract. Coordination between the Contractor and the Owner shall consist of, but not limited to that specified herein. The Contractor is responsible for modifications that may be necessary as a result of component substitutions. The modified code and all rights of ownership thereto shall be surrendered to the Owner upon completion of the project.
  - 1. Contractor shall attend a minimum of three (3) meetings with the Owner to review programming and Control Flow specific to the project. The Contractor programmer shall attend these meetings.
  - 2. Control Flow drawings shall be submitted in the format agreed during Meeting 1. Subsequent meetings will review the Control Flow diagram with all in agreement prior to implementation.
  - 3. Technical review – Controller system mock-up meeting with the Owner and the programmer.
  - 4. End-user review – Controller system mock-up meeting with the Owner and the programmer.

1.4 Quality Assurance

- A. Performance Verification: All digital video systems shall be pre-tested to verify the complete compatibility of all sending, receiving and distribution components and the performance and integrity of the transmission media. The performance of each system shall be demonstrated, with all proposed components, in the presence of the Design Engineer and/or Owner prior to

approval and installation. Any system failing to meet the specified performance requirements shall be rejected and re-configured as required prior to re-testing.

- B. All system components shall be UL listed.
- C. Installation shall be in compliance with the National Electric Code and all other applicable codes.
- D. All equipment described herein or otherwise required to perform the specified system functions shall be a regular product line, produced by the system manufacturer.
- E. All materials furnished under this contract shall be new, of highest quality and shall be of a regularly manufactured line, currently in production at the time of installation.

#### 1.5 Contractor Qualifications

- A. The A/V equipment package shall be furnished and installed by a contractor who meets all the requirements listed herein. It shall not be acceptable for the A/V contractor to utilize a Subcontractor for any portion of the work, unless the Subcontractor has been approved in writing by the Engineer based upon adherence to the qualifications listed herein.
- B. The Contractor shall maintain a fully equipped, factory certified service organization capable of providing full maintenance and service of the installed system within 24 hours. This facility shall be available for inspection by the Engineer.
- C. Equipment supplier shall have a service organization within 75 miles of the project site.
- D. The Contractor shall have on staff an Infocomm International-certified CTS-I AV systems engineer/project manager responsible for overseeing the project and the lead technician (not installers) shall have a CTS certification.
- E. The Contractor shall have a "Certified Programmer inches on staff. The Contractor shall provide a copy of the certificate bearing the name of the programmer.
  - 1. Documentation of the Integrator's Certified Programmer's continuing education shall also be submitted. Certified Programmer shall have completed continuing education training within the past 12 months of bidding on this RFP.
  - 2. The Contractor shall be Certified for the system being installed and be able to demonstrate a minimum of one (1) DM installation of similar size and scope within the past year.
- F. The Multimedia Systems Contractor shall:
  - 1. Be an authorized dealer/service organization for all major items of electronic equipment furnished.
  - 2. Employ, on a full-time basis, a qualified audio/electronics Engineer under whose direction and supervision the entire installation shall be carried out.
  - 3. Employ, on a full-time basis, trained technician(s) who are experienced in the installation of sound reinforcement equipment, its interconnector and setup.
  - 4. System Contractors shall have a "Certified Programmer" on staff. The Contractor shall provide a copy of the certificate bearing the name of the programmer.
  - 5. Employ, on a full-time basis, a RCDD (BICSI certified) Engineer under whose direction and supervision the entire installation shall be carried out.



## 1.6 Shop Drawings

- A. A complete and comprehensive list of materials with quantity, manufacturer, model and part number and reference to the Part 2 specification paragraph number for each item.
- B. Manufacturers Data Sheets of all products and cabling, specific to the project. Data sheets shall show the exact parts, with model numbers and options as required and clearly identified.
- C. Qualifications: A statement of contractor's qualifications to verify compliance with other provisions within the specifications, unless the contractor has been pre-approved.
- D. Job specific diagrams.
  - 1. This indicates a block schematic diagram that shows all major items of equipment required for the contract project and the actual interconnections that will be installed, including details of interconnection with other systems.
  - 2. Point-to-point wiring diagrams of the complete system including detailed interconnectivity with ancillary systems.
  - 3. Riser diagram showing conduit requirements with pull boxes, outlet boxes, part numbers of cable used, and a number of circuits in each conduit.
  - 4. Electrical power requirements for the head-end and ancillary equipment. Include diagrams for any remote control of electrical power, in sufficient detail to coordinate with electrical work. Electrical diagrams shall also indicate all required plug and power outlet configurations including where direct connection is required/preferred.
  - 5. Rack elevations showing the configuration of all rack mounted equipment.
  - 6. 30x42 floor plans at a scale of not less than 1/8 inch=1 foot-0 inches showing the location of all items of equipment. Drawings shall also indicate each location where electrical power is required, and the specific configuration of that power connection (voltage, plug type, mounting height, etc.)
  - 7. Proposed construction details for all custom fabricated items, including wall plates, interface panels, mounting hardware and systems, and rigging hardware. These details shall show labeling, dimensions and indicate finishes and color selection.
- E. Software data – The data package shall consist of manufacturer's data sheets of all system and application software being provided with sufficient information to verify that all specified features and functions are being addressed.
- F. Submittals that do not contain all the required information will be REJECTED unless prior approval for partial submittals has been approved.

## **PART 2 - PRODUCTS**

- 2.1 Products shall be as specified on Drawings

## **PART 3 - EXECUTION**

### 3.1 General Installation

- A. Equipment shall be furnished and installed in accordance with manufacturer's recommendations in compliance with all local, city, state and national codes.

- B. Provide all hardware, framing members, etc. as required for mounting equipment. Coordinate all structural mounting points and locations and load requirements with Architect/General Contractor.
- C. All penetrations in smoke or firewalls shall be sealed with fire stop rated for this purpose.
- D. The installation of all work shall be neat and of professional quality. Cooperate with other trades in order to achieve well-coordinated progress and satisfactory final results. Execute without claim for extra payment minor moves or changes in equipment locations to accommodate equipment of other trades or the architectural symmetry of the facility.
- E. Installation shall follow industry standard wiring and installation practice, and shall meet or exceed industry standards for such work, with particular attention given to any installation instructions in Parts 1 and 2 of these Specifications.
- F. Equipment shall be secured firmly with proper types of mounting hardware. All equipment affixed to the building structure must be self-supporting with a safety factor of at least three unless otherwise stated.
- G. All equipment shall be installed so as to provide reasonable safety to the operator.
- H. All overhead or wall-mounted speaker systems shall be supported from the building structure utilizing the materials and methods recommended by the speaker manufacturer and good rigging practices, providing a load-rated safety factor of six (6). All required installation material and labor shall be deemed included in these specifications.
- I. Furnish the system to facilitate expansion and servicing using modular, solid-state components. All equipment shall be designed and rated for continuous operation and shall be UL listed where applicable, or manufactured to UL standards.
- J. It will be the responsibility of this contractor to provide all programming of the room control system to incorporate the functionality Middletown Courts requires.
- K. In addition to the GUI provided the technology systems contractor will provide an Ethernet based executable GUI for interfacing to the system.
- L. Technical Systems Manual, custom-written by the Contractor, for the purpose of instructing the Owner's operating personnel in the detailed step-by-step operation of the system and preventative maintenance procedures. This manual shall include descriptions of the system components and their relationship to system function. This manual shall be bound separately and labeled appropriately.
- M. Equipment shall be furnished and installed in accordance with manufacturer's recommendations in compliance with all local, city, state and national codes.
- N. Provide all installation hardware as required for mounting video displays, projectors and speakers. Coordinate all structural mounting point locations and load requirements with architect and general contractor.
- O. All penetrations in smoke or firewalls shall be sealed with fire stop rated for this purpose.
- P. The installation of all work shall be neat and of professional quality. Cooperate with other trades in order to achieve well-coordinated progress and satisfactory final results. Execute

without claim for extra payment for minor moves or changes in equipment locations to accommodate equipment of other trades or the architectural symmetry of the facility.

### 3.2 Wiring Installation

- A. Observe proper circuit polarity and loudspeaker wiring polarity. No cables shall be wired with a polarity reversal between connectors with respect to either end. Special care shall be taken when wiring microphone cables, to ensure that uniform polarity is maintained. Balanced audio connectors shall be wired with shield at Pin #1, hi/positive at Pin #2.
1. All audio circuits shall be balanced and floating, except as noted in the specifications or directed by Heapy Engineering at the time of final equalization and testing. Shields of audio cables installed between active interconnected equipment components shall be grounded at the sending end only.
  2. All cables shall be installed in conduit except above accessible ceilings, where they shall be installed utilizing J-hooks or bridle rings on minimum 5 ft. centers or cable tray, where available.
  3. Separate conduits and/or cable harnesses shall be maintained for cables in the following categories
    - a. Levels below -20 dBm (microphone).
    - b. Nominal line levels from -20 dBm to +30 dBm (line).
    - c. Loudspeaker
    - d. Control
    - e. Power
    - f. Video
  4. Cable management system shall be secured to building structure utilizing manufactured approved methods and hardware. Cable management system support components shall be designed with wide support surfaces that do not cause cables to be bent, crushed or otherwise deformed when installed within component loading parameters. Cable management system shall meet UL standards and be UL labeled. Utilizing elements of the building's structure such as beams, joists, etc. to hang cable from will not be acceptable.
  5. Group and route all cables within equipment cabinets according to type and function and separate according to signal levels. All cables shall be continuous lengths without splices.
  6. Cables shall be handled and installed with extreme care. Tie wraps shall **loosely** hold cables; **do not over-tighten**. Cables shall have sweeping bends and shall have a maximum bending radius at any point in the installation of not less than 4 times the outer diameter of the cable. The cable manufacturer's recommended bending radius and maximum pulling tensions shall be strictly adhered and shall not be exceeded. Failure to comply will result in the removal and replacement of affected cable at no additional cost to the Owner.
  7. Cable pathways shall provide the following minimum clearances (parallel or perpendicular)
    - a. Motors and transformers – 48 inches.
    - b. Conduit and cable used for electrical power distribution – 12 inches.
    - c. Fluorescent lighting – 5 inches.
    - d. Power lines up to 2kVA – 5 inches.
    - e. Power lines over 5kVA – 24 inches.
    - f. Hot water/steam lines - Bare –18 inches, Insulated – 6 inches.
  8. All cabling installed in underground conduit installations shall be outdoor rated cables, acceptable for use by the manufacturer in underground applications.

9. All system wire shall be terminated by approved soldered or mechanical means. No unterminated wire ends will be accepted. Heat shrink type tubing shall be used to insulate and dress the ends of all ground or drain wires.
10. All solder joints and terminations shall be made with rosin-core silver solder. No lead based solder shall be accepted.
11. Mechanical connections shall be made using approved connectors of the correct size and type for the connections. Wire nuts are not acceptable except in the case of distributed, constant-voltage speaker systems.

### 3.3 Programming

- A. AV Distribution System and controller shall be programmed as described herein and as required by owner. Contractor to develop system programming through a series of meetings, storyboard submittals and a final virtual run-through prior to programming. Programming shall be submitted to Heapy Engineering prior to application for approval.
- B. Program flow drawings shall be submitted by the contractor for review prior to any programming taking place. No fewer than three meetings shall take place regarding program flow and touch panel interface prior to any programming being started.
- C. Program flow review with follow-up email communication and approval or in-person meetings as necessary.
- D. Technical review of touch panel (mock-up touch panel will be required at this meeting).
- E. If necessary, access to the Owner's network for programming can be granted. Any request for this type of access should be submitted in writing no fewer than ten (10) business days prior to need.
- F. Programming - Controller shall be programmable with graphic page as required to offer controls for A/V equipment connected to the system.

### 3.4 Tests

- A. Upon completion of installation and satisfactory testing of system by Contractor in presence of the equipment supplier, the Contractor shall test the system in the presence of the Owner and the Engineer to demonstrate satisfactory performance.
- B. System shall be tested by and a certificate of inspection shall be furnished by a qualified manufacturer's representative or equipment vendor; Submit report indicating result to the Engineer.
- C. A qualified technical representative of the system contractor shall do systems acceptance testing. Installation must be complete in all respects before acceptance testing. Acceptance testing and training must be scheduled on separate dates to allow time for corrections, if necessary. Once all functions and devices within the system have been adequately demonstrated to be working properly, a complete owner's manual will be presented to the Owner's agent. It shall contain a comprehensive list of all supplied equipment, a complete point-to-point system wiring diagram with "AS BUILT" wire numbers indicated, details of hook-up connections including build-out devices (active and passive), systems control settings record, the final test results including plotted frequency response curves, operation and maintenance manuals for each active device including schematic diagrams and parts list. A thoroughly completed commissioning checklist (re: InfoComm's AV Installation Handbook

Appendix J: Audiovisual Systems Commissioning Tests Checklist) shall be included with the Owner's Manual.

- D. The Contractor shall be prepared to verify the performance of any portion of the system by demonstration, listening tests and/or instrument measurements.
- E. Measurement of frequency response, distortion, noise, or other characteristics shall be performed (or a demonstration test requested) if deemed necessary to determine proper operation.
- F. The Contractor shall make additional mechanical and electrical adjustments within the scope of the work and which are deemed necessary by the Engineer as a result of acceptance tests.
- G. Test Reports and Certification: Submit results of all tests conducted above and certification that the installation is complete and ready for checkout as specified.

### 3.5 Identification/Labeling

- A. Contractor shall identify all major items of equipment and tag all cables with permanent type markers to denote equipment served. Cables shall be tagged at both end and at each point where the cable is administered.
- B. The contractor shall be responsible for applying a permanent label to each cable to indicate source and destination.
- C. All labeling and recording shall be approved by the Owner and the Engineer prior to application.

### 3.6 Training

- A. Provide step-by-step user instructions identifying operator controls for normal use operations. This shall be included with the O&M manuals.
- B. The contractor shall arrange for a total of sixteen (16) hours for end user training on the various A/V Systems. This training shall be planned and scheduled with the Owner. Training plan shall be pre-approved by the Engineer/Architect and shall include a review of the proposed syllabus.
- C. Video record the training sessions and provide an electronic copy to the Owner.

### 3.7 O & M Manuals

- A. Copies of all approved shop drawings with the Engineer's stamp.
- B. Owner's manuals for every item of equipment when available from the manufacturer. These shall be the technical manuals provided by the manufacturer and shall not consist of generic sales brochures. Technical manuals shall provide complete specifications for the equipment as well as complete operating, maintenance, troubleshooting and product repair/replacement information. Where available only in electronic format, the contractor may provide a CD with electronic versions of Owner's manuals. CDs containing electronic versions of Owner's manuals must contain the proper software viewers for each document type.

- C. Technology drawings updated with final as-built information. This shall be in the form of a complete set of Technology drawings with as-built information indicated in colored pen based upon actual field conditions.
- D. System schematic and block diagrams for every system updated with final as-built information. These drawings shall define the exact arrangement of each system including wiring configuration, device locations and cable types.
- E. Rack elevations for all systems with rack mounted equipment.
- F. System Operating Instructions: Provide a clear and concise description of operation which gives, in detail, the information required to properly operate the equipment and system.
- G. Manufacturer's warranties and operating instructions for each and every equipment item furnished. Include a copy of the Certificate of Warranty, signed by both parties.
- H. Provide statement of warranty with O&M Manuals.
- I. Provide four (4) copies of each of the following:
  - 1. Bound and labeled user manuals and cut sheets for each piece of installed equipment. A complete as-installed equipment list, listed by room, with manufacturers' names, model numbers, serial numbers and quantities of each item.
  - 2. Bound set of printed CAD drawings for each system. Floor plans, prepared at a scale of not less than 1/8 inches = 1 foot 0 inches showing speaker locations and orientation, wall plates, rack locations and other related device locations.
  - 3. Archived version or electronic copy of editable CAD drawings for each installed system.
  - 4. Electronic copy of uncompiled source code including any processor, touch panel, XPanel and modules installed in the systems and touch panels.
    - a. Upon completion of the system programming the integrator shall provide The Ohio State University with the uncompiled source code and all modules used in the creation of the program. This shall be completed using the Archive function of the programming software.
  - 5. A complete and correct system schematic, showing detail connections for all parts of the system, including wire numbers, terminal block numbers and layouts and other designations and codings. System performance measurements as noted elsewhere in this specification shall be documented. Include diagrams or charts showing final setting of all control knobs in the system (mixers, equalizers, power amplifiers, etc.)
  - 6. Complete equipment rack/podium layouts showing all rack mounted equipment items.
  - 7. Riser diagrams showing installed conduit with pull boxes, outlet boxes, part number of cable types used, and number of circuits in each conduit.
  - 8. Operations manuals for each and every major equipment item furnished.
  - 9. Copies of any operating and/or setup software.

### 3.8 Warranty

- A. Warrant all workmanship, equipment, material and software entering into this contract for a period of three (3) years from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect or Construction Manager. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Provide a statement of this warranty with the O & M Manuals.
- B. During the warranty period, report to the site and repair or replace any defective materials or workmanship without cost to the Owner. Warranty service shall be rendered within 24 hours

after request by the Owner. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made.

- C. Where warranties on individual pieces of equipment exceed three (3) years, the guarantee period shall be extended to the warranty period of the particular items.
- D. After completion of the work, the Contractor shall submit a Certificate of Warranty, stating commence and expiration dates and conditions of the warranty, for signature of both participating parties. Incremental warranties for complete portions of the work may be negotiated at the discretion of the Owner, if delays occur beyond the control of the Contractor.

END OF SECTION





**27 41 19 VIDEO DISPLAY EQUIPMENT**

**PART 1 - GENERAL**

1.1 Scope

- A. The work described by this section includes the furnishing of all components, materials, equipment, installation and technical labor and the performance of all operations necessary for the complete installation of an audio visual system in operating condition as indicated on the drawings and/or specified herein.
- B. Included in the Scope of this Section:
  - 1. Licenses, permits as may be applicable
  - 2. Provision of submittal information
  - 3. Installation in accordance with contract documents, manufacturers' recommendations and applicable codes
  - 4. Programming and configuration of control and signal processing software
  - 5. Testing and adjustments, including documentation thereof
  - 6. Provision of manuals
  - 7. Maintenance and warranty services
- C. Applicable References:
  - 1. National Electric Code (NEC)
  - 2. Underwriters Laboratories (UL)
  - 3. Infocomm International AV Installation Handbook –2nd Edition
  - 4. Telecommunications Distribution Methods Manual (TDMM)
- D. In general, the conduit and/or cable tray, junction boxes, electrical power circuits and outlets and terminal cabinets, as required for a complete operating system, shall be furnished and installed by the Electrical Contractor under a separate contract. The entire responsibility for the system, its installation, operation and function shall be that of the Systems Contractor.

1.2 Description of Work

- A. Work consists of new A/V Display Equipment including:
  - 1. Television/Flat Panel Monitors complete with wall/ceiling mounting hardware and connection to the Network/broadband video distribution system and the local AV Distribution System as detailed on the drawings and as specified herein.
  - 2. Digital Video Projectors complete with wall/ceiling mounting hardware and connection to the Network/broadband video distribution system and the local AV Distribution System as detailed on the drawings and as specified herein.
    - a. Digital Video Projector Lift complete with ceiling mounting hardware and supplemental structural support as detailed on the drawings and as specified herein.
- B. Digital Video Projection Screen complete with wall/ceiling mounting hardware and connection to the local audio/video control system as detailed on the drawings and as specified herein.
- C. All material and/or equipment necessary for proper operation of the system, not specified or described herein, shall be deemed part of these specifications.

1.3 Quality Assurance

- A. All system components shall be UL listed.
- B. Installation shall be in compliance with the National Electric Code and all other applicable codes.
- C. All equipment described herein or otherwise required to perform the specified system functions shall be a regular product line, produced by the system manufacturer.
- D. All materials furnished under this contract shall be new, of highest quality and shall be of a regularly manufactured line, currently in production at the time of installation.

#### 1.4 Contractor Qualifications

- A. The A/V equipment package shall be furnished and installed by a contractor who meets all the requirements listed herein. It shall not be acceptable for the A/V contractor to utilize a Subcontractor for any portion of the work, unless the Subcontractor has been approved in writing by the Engineer based upon adherence to the qualifications listed herein.
- B. The Contractor shall maintain a fully equipped, factory certified service organization capable of providing full maintenance and service of the installed system within 24 hours. This facility shall be available for inspection by the Engineer.
- C. Equipment supplier shall have a service organization within 75 miles of the project site.
- D. The Contractor shall employ factory trained service personnel for the service and maintenance of the system.
- E. (SCC) The Multimedia Systems Contractor shall:
  - 1. Be an authorized dealer/service organization for all major items of electronic equipment furnished.
  - 2. Employ, on a full-time basis, a qualified audio/electronics Engineer under whose direction and supervision the entire installation shall be carried out.
  - 3. Employ, on a full-time basis, trained technician(s) who are experienced in the installation of sound reinforcement equipment, its interconnector and setup.
  - 4. System Contractors shall have a "Certified Programmer" on staff. The Contractor shall provide a copy of the certificate bearing the name of the programmer.
  - 5. Employ, on a full-time basis, a RCDD (BICSI certified) Engineer under whose direction and supervision the entire installation shall be carried out.

#### 1.5 Shop Drawings

- A. A complete and comprehensive list of materials with quantity, manufacturer, model and part number and reference to the Part 2 specification paragraph number for each item.
- B. Manufacturers Data Sheets of all products and cabling, specific to the project. Data sheets shall show the exact parts, with model numbers and options as required and clearly identified.
  - 1. Drawings shall include designations, dimensions, operating controls, electrical requirements, input/output configurations, operating controls, etc.
  - 2. Major components including all sub-assembly components (daughter cards, option cards, etc.) required to perform the specified functions.
  - 3. Any items of equipment which have features and/or functions that deviate from the specifications contained herein, shall have these deviations clearly called out by a

separate attachment with the shop drawings specifically listing and detailing the deviation along with a justification. Deviations must be approved specifically in writing.

- C. Job specific diagrams.
- D. 30x42 floor plans at a scale of not less than 1/8 inches=1 foot-0 inches showing the location of all items of equipment. Drawings shall also indicate each location where electrical power is required, and the specific configuration of that power connection (voltage, plug type, mounting height, etc.)
- E. Proposed construction details for all custom fabricated items, including wall plates, interface panels, mounting hardware and systems, and rigging hardware. These details shall show labeling, dimensions and indicate finishes and color selection.
- F. Submittals that do not contain all the required information will be REJECTED unless prior approval for partial submittals has been approved.

## **PART 2 - PRODUCTS**

- 2.1 All Products shall be as specified on drawings

## **PART 3 - EXECUTION**

### 3.1 General Installation

- A. Equipment shall be furnished and installed in accordance with manufacturer's recommendations in compliance with all local, city, state and national codes.
- B. Provide all hardware, framing members, etc. as required for mounting supports.
- C. All penetrations in smoke or firewalls shall be sealed with fire stop rated for this purpose.
- D. The installation of all work shall be neat and of professional quality. Cooperate with other trades in order to achieve well-coordinated progress and satisfactory final results. Execute without claim for extra payment minor moves or changes in equipment locations to accommodate equipment of other trades or the architectural symmetry of the facility.
- E. SCC owns our code and drawings (all other work conditions not acceptable)
- F. Equipment and labor shall be warranted for no less than one year from final sign off acceptance.

### 3.2 Flat Panel Installation

- A. Contractor shall field verify the location of each flat panel with surrounding structural elements and room furnishings at the proposed mounting location to ensure proper installation prior to mounting equipment. Where field conditions will not provide the correct application for the proposed flat panel type/location/mounting method, the contractor shall notify the Engineer/Architect in writing. Notification shall include proposed alternatives for review.
- B. Flat panel displays shall be mounted straight, level and true.
- C. Contractor shall custom configure the flat panel video/image/setting menus once source equipment and AV system is operational. Flat Panels with tuners shall have the broadband

CATV channels scanned and programmed once the system is active. Flat panel set-up shall be completed and the optimal settings stored for later recall.

- D. Programming of flat panels and centralized AV control software including all network assignments, passwords, schedules, etc.

### 3.3 Programming

- A. Integrator will be required to attend a minimum of (3) meetings with SCC consultants and college Media Services for the purpose of reviewing plans, touch panel mockup technical reviews, and touch panel end-user usage review. These meetings will be required prior to any programming begins to eliminate confusion

### 3.4 Tests

- A. Upon completion of installation and satisfactory testing of system by Contractor in presence of the equipment supplier, the Contractor shall test the system in the presence of the Owner and the Engineer to demonstrate satisfactory performance.
- B. System shall be tested by and a certificate of inspection shall be furnished by a qualified manufacturer's representative or equipment vendor; Submit report indicating result to the Engineer.

### 3.5 Identification/Labeling

- A. Contractor shall identify all major items of equipment and tag all cables with permanent type markers to denote equipment served. Cables shall be tagged at both end and at each point where the cable is administered.
- B. The contractor shall be responsible for applying a permanent label to each cable to indicate source and destination.
- C. All labeling and recording shall be approved by the Owner and the Engineer prior to application.

### 3.6 Training

- A. Provide step-by-step user instructions identifying operator controls for normal use operations. This shall be included with the O&M manuals.
- B. The contractor shall arrange for a total of sixteen (16) hours for end user training on the various A/V Systems. This training shall be planned and scheduled with the Owner. Training plan shall be pre-approved by the Engineer/Architect and shall include a review of the proposed syllabus.
- C. Video record the training sessions and provide an electronic copy to the Owner.

### 3.7 O & M Manuals

- B. Provide 3 copies of each of the following at job completion:
  - 1. Bound and labeled user manuals and cut sheets for each piece installed equipment
  - 2. Bound set of printed CAD drawings for each installed system

3. Electronic copy of editable CAD drawings for each installed system
  4. Electronic copy of uncompiled source code installed in the systems
  5. Upon completion of the system programming the integrator shall provide SCC the uncompiled source code, all modules, and touch panel files used in the creation of the program. This shall be completed using the Archive function of the programming software.
- C. It will be the responsibility of the integrator to provide all programming of the room control system to incorporate the required functionality SCC requires.
- D. In addition to the GUI provided the technology systems contractor will provide an Ethernet based executable GUI (Xpanel) for interfacing to the system.
- E. MAC addresses and room locations shall be provided to SCC five full business days prior to the system installation so the IP addresses may be assigned. Systems will be configured to use reserved IP addressing for Xpanel and access
- F. Integrator shall supply, in editable electronic format, a list consisting of make/model/serial number/install location of each piece of installed equipment
- G. Vendor shall be required to submit an approval packet of the designs they plan in specified format before programming starts.
- H. Provide statement of warranty with O&M Manuals.

### 3.8 Warranty

- A. Warrant all workmanship, equipment, material and software entering into this contract for a period of three (3) years from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect or Construction Manager. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Provide a statement of this warranty with the O & M Manuals.
- B. During the warranty period, report to the site and repair or replace any defective materials or workmanship without cost to the Owner. Warranty service shall be rendered within 24 hours after request by the Owner. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made.
- C. Where warranties on individual pieces of equipment exceed three (3) years, the guarantee period shall be extended to the warranty period of the particular items.
- D. After completion of the work, the Contractor shall submit a Certificate of Warranty, stating commence and expiration dates and conditions of the warranty, for signature of both participating parties. Incremental warranties for complete portions of the work may be negotiated at the discretion of the Owner, if delays occur beyond the control of the Contractor.

END OF SECTION



**28 13 00 PHYSICAL ACCESS CONTROL (PACS)**

**PART 1 - GENERAL**

1.1 Scope of Work

- A. These specifications shall be utilized for the complete system as specified herein and as shown on the bid documents

1.2 Scope of Work

- A. Provide an expansion of the existing Lenel OnGuard Physical Access Control System (PACS) which fully integrates all the functions and features specified herein for electronic access control.
- B. The scope includes all hardware, cabling, software, licenses, programming, Software Support Agreements, training and services required to provide a fully operational system, programmed to the Owner's requirements and containing all software and licenses required to perform the specified functions.
- C. These specifications contained herein describe specific functional requirements of the PACS as required by the Owner. It is the intent of these specifications to detail and describe the performance of the system. The system features outlined in the specifications are deemed mandatory for the project. References to model numbers are intended only for descriptive purposes. Systems that deviate from these Performance Specifications shall be considered alternate systems.

1.3 System Description

- A. The PACS shall be an expansion of the existing Lenel OnGuard Electronic access control system providing local, remote and Time Of Day control of new doors as indicated on the drawings and as specified herein.
- B. The following main components are considered part of the project:
  - 1. Credential Readers
  - 2. Access Control Module
    - a. Field installed controllers, Power supplies, Sensors, Cabling
  - 3. Alarm management module (AMM)
    - a. Sensors, Controllers, Communications gateways, Cabling
- C. System Cabling and pathways.
- D. System programming a total system sequence of operation for the system.

1.4 Quality Assurance

- A. All system components shall be UL listed.
- B. Installation shall be in compliance with the National Electric Code and all other applicable codes. The system shall be in compliance withal FCC Rules and Regulations.

- C. All equipment described herein shall be the product of a manufacturer of established reputation and experience, who shall have produced similar equipment for a period of at least 2 years and who shall be able to refer to similar installations within a 75 mile radius now rendering satisfactory service.
- D. The manufacturer and their local agent shall show satisfactory evidence upon request that they maintain a fully equipped service center capable of furnishing adequate inspection and service to the equipment including standard replacement parts. The manufacturer and /or agent shall be prepared to offer a service contract for the maintenance of the system after the warranty period.
- E. To establish continuity in the manufacturer, systems components shall be the standard product of one manufacturer. Further, an effort shall be made to establish common sources for equipment of all systems. The manufacturer will have a minimum of five (5) years' experience in the manufacture of progressive products specified.
- F. All materials furnished under this contract shall be new, of highest quality and shall be of a regularly manufactured line, currently in production at the time of installation.
- G. All material furnished under this contract shall meet or exceed minimum performance and operational requirements as established by the system vendors for the configurations being implemented for this project.

#### 1.5 Contractor Qualifications

- A. **The PACS shall be furnished, installed and programmed by a Lenel certified contractor** who meets all the requirements listed herein. It shall not be acceptable for the PACS contractor to utilize a sub-contractor for any portion of the work, unless the sub-contractor has been approved in writing by the Engineer based upon adherence to the qualifications listed herein.
- B. The Contractor shall maintain a fully equipped, factory certified service organization capable of providing full maintenance and service of the installed system within 24 hours. This facility shall be available for inspection by the Engineer.
- C. The Contractor shall employ factory trained service personnel for the service and maintenance of the system.
- D. The Contractor shall have had a minimum of 1 year experience with the specified PACS. This experience shall include having completed a minimum of 2 installations in the past 24 months of similar size and scope. The Contractor shall provide references and contact information for the project sites in which the qualifying installations occurred.

#### 1.6 Shop Drawings – The submittals shall consist of the following information:

- A. Job specific system block diagram indicating the actual hardware required for the project including part numbers and interconnecting wiring requirements.
- B. Complete and comprehensive Equipment Catalog Specification Sheets of each component provided, job specific.
- C. 30x42 floor plans at a scale of not less than 1/8 inches=1 feet-0 inches showing location of all items of equipment. Drawings shall also indicate each location where 120 power is required.

## PART 2 - PRODUCTS



## 2.1 Product Equivalency

- A. Where products are listed with multiple manufacturers, these manufacturers will be approved as equals **if all specified features are provided**. Any equipment not specifically approved in writing prior to the bid date will not be considered regardless of qualifications. Failure to provide the "precise functional equivalent" shall result in the removal of the alternate equipment at the Contractor's expense.
- B. Different manufacturers may require various options, accessories, converters, patch cables, etc. to perform the specified features and functions. Therefore, all material and/or equipment necessary for proper operation of the system shall be deemed part of these specifications.
- C. This specification is intended to establish a carefully planned minimum level of quality and performance for all components, and will be rigorously enforced by Owner. Acceptable manufacturer of components described herein are:
  - 1. Lenel
- D. The PACS shall be a regularly manufactured system offered by a single manufacturer/source as an integrated system.
- E. Contractors shall submit reference letter with information regarding current installations utilizing the listed manufacturer pairings along with contact information at each installation site. Reference letter shall include brief summary of system scope for both CCTV and PACS and level of integration being utilized.
- F. Final approval of systems listed above shall be at the discretion of the owner/engineer pending review of system reference information and back-up documentation. Upon request by Owner/Engineer, contractor and/or manufacturer may provide on-site product demonstration to validate system ability to meet specified level of integration.

## 2.2 Credential Readers

- A. Credential readers shall comply with OSDP standards
- B. Read Technology – HID iClass RP40.
- C. Form Factor
  - 1. Wall – Provide standard wall box as required by system manufacturer.

## 2.3 Access Control Module

- A. Data Gathering Panels (DGP) Field Controllers
  - 1. Door Controllers
    - a. Door control panels shall include Bus based communications portals to Central Controllers/PACS servers. Panels shall provide multiple door control (2, 4, or 8) per board with Reader/REX/Contact and 2 alarm relays per door. The controller utilizes a locally stored database so that it continues to operate without the presence of the Central Controller, making all access decisions and recording all transactions.

2. Panel Hardware
  - a. Provide wall mounted, lockable panel tubs with tamper switch for all equipment.
  - b. Provide required power supplies with additional battery back-up for minimum 1 hour standby power.
  - c. All cabling within panels to be organized and managed and fully labeled.
- B. Door position sensors
  1. Balanced Magnetic position switch – Refer to Door Control Schedule for application at each controlled portal.
  2. Mounting - Refer to Door Control Schedule for application at each controlled portal.
  3. Utilize sensors to provide door position status during occupied hours as required by Owner's programming and alarm points when so programmed or required by the Owner's sequence of operation.
- C. Request to Exit
  1. Devices (alarm shunt) –
    - a. Door Hardware - REX switch to be integral with door hardware. REX device to provide alarm free exit of monitored doors during system operation. REX devices shall be wired and programmed as part of this contract.
- D. Electronic door hardware
  1. Refer to Specification DIVISON 08 for electronic door hardware.
  2. Electronic hardware is being installed in the door frames (locks, hinges, power transfers) by DIVISON 08. This contract shall be responsible for low voltage door hardware power supplies, connecting all low voltage wiring from door hardware and power supplies to the access control system for a complete, functional and operating system.
  3. Low voltage power, wiring and controls to electronic door hardware to remotely lock/unlock selected doors in real time via the software GUI, through local credential readers, through TOD schedules, interface with intercom system, or remote push button devices. System shall provide the Owner with the ability to remotely control doors from the remote access workstations, head end server, associated credential readers, request-to-exit devices, intercom system, local push button release, and the fire alarm system.
- E. Power Supplies
  1. PACS Equipment
    - a. Power supply/chargers with 115VAC, 60Hz input, fused four (4)/eight (8)/sixteen (16), fuse/PTC protected outputs. Outputs are selectable for 12VDC with a total of 4A max. or 24VDC with a total of 3A max

- b. Supervision
    - 1) AC Failure Form "C" contacts
    - 2) Battery Form "C" contacts
    - 3) Indicators (LED)
      - a) Input 115VAC is present
      - b) DC Output Powered
      - c) Battery Discharged or not connected
  - c. Back-up Battery
    - 1) Capacity: Sized to provide operational power for a minimum of twelve (12) hours).
    - 2) Type Sealed lead acid/gel type/Lithium Ion.
    - 3) Fuse Rating 15A @ 32VDC
    - 4) Failover Upon AC loss, instantaneous
  - d. Listings
    - 1) UL294 Access Control System Units
    - 2) UL603 Power Supplies for Use with Burglar-Alarms Systems
    - 3) UL 1069 UL Listed Hospital Signaling and Nurse Call Equipment
    - 4) UL1481 Power Supplies for Fire Protective Signaling System
  - e. Form Factor – Wall mount panel with locking cover/rack mount enclosure.
2. Door Hardware
- a. Input Voltage: 12 to 24 VAC or VDC operation, 0.6A @ 12V, 0.3A @ 24V current consumption with all relays energized. Main fuse is rated at 10A/250V
  - b. Trigger Inputs: Eight (8) Access Control System trigger inputs:
    - 1) Eight (8) normally open (NO) inputs
    - 2) Eight (8) open collector sink inputs
    - 3) Any combination of the above
  - c. Input Options:
    - 1) One (1) common power input (board and lock power)

- 2) Two (2) isolated power inputs (one (1) for board power and one (1) for lock/accessory power)
- 3) Fire Alarm input.
- d. Outputs
  - 1) Eight (8) independently controlled 2.5A outputs:
    - a) Eight (8) Fail-Safe and/or Fail-Secure power outputs (field selectable)
    - b) Eight (8) dry form "C" 5A rated relay outputs.
    - c) Any combination of the above
    - d) Eight (8) auxiliary power outputs (unswitched)
  - e. Output ratings: Output fuses are rated 3.5A/250V each
  - f. Indicators (LED)
    - 1) Red LEDs Outputs are triggered (relays energized)
    - 2) Green LED FACP disconnect is triggered
  - g. Battery Back-up
    - 1) Provide battery back-up with charging system to panel power supply to fully power locks during normal power failure.
  - h. Listings
    - 1) UL294 Access Control
  - i. Form Factor – Wall mount panel with locking cover/rack mount enclosure.

#### 2.4 Wire and Cable

- A. Contractor shall include all necessary wire, cable and accessories for a complete working system.
- B. Utilize cable types as recommended by the system/equipment manufacturer.
- C. All cabling to be plenum rated when installed open wired.
- D. The following cable types at a minimum are required:
  1. Lock Power
  2. REX monitoring
  3. Latch bolt monitoring

4. Door Position switch monitoring
  5. Credential Reader
- E. The use of “composite” Access Control cabling consisting of multiple cable types manufactured under a single jacket shall be allowed.
- F. Cabling scope shall include connections to any device “pigtails” provided with the PACS end device.

### **PART 3 - INSTALLATION**

#### **3.1 General Installation**

- A. Install systems in accordance with UL, NEC and all other applicable codes. Install system to comply with drawings and final shop drawings in compliance with manufacturer instructions. Provide all required hardware and labor for rack mounting of head-end system components.
- B. Refer to plans for locations and quantities of equipment. Equipment locations shown on plans will be required to be field coordinated to ensure proper system operation.
- C. No items of equipment shall be installed in such a manner as to void or reduce the proper operating characteristics of individual components or of the system. Devices such as motion detectors, audio detectors, glass break sensors, etc. shall be installed following the manufacturer’s recommendations.
- D. Perform all work under the on-site supervision of a factory authorized trained technician. It shall be the responsibility of the technician to check, inspect and adjust this installation to the engineer’s and Owner approval. A CSR of the installing contractor or manufacturer shall train the Owner’s personnel on the proper operation and maintenance of the equipment. Perform all work in conjunction with this installation in accordance with good engineering practices as established by NEC.

#### **3.2 Wiring Installation**

- A. All wiring between devices shall be run open wired above accessible ceilings. Where existing cable management systems are in place and there is adequate capacity to install the PACS wiring, the contractor may utilize these pathways providing they have coordinated with all other wiring contractor on site.
- B. Where pathways do not exist for PACS wiring, this contract shall be responsible for providing all required cable management systems such as sleeves, conduits, J-hooks, etc. to support communications cabling to meet building codes and manufacturer’s recommendations.
- C. All cabling installed in ceiling spaces that are used for air distribution plenums shall be UL plenum rated.
- D. This contract shall be responsible for furnishing and installing all required cabling between components to form a complete and operational system meeting all the requirements of this specifications.
- E. The PACS contractor shall be responsible for interconnection and signaling including all wiring and terminations at both ends for the following auxiliary systems

1. Fire Alarm – for control of doors during fire alarm, and for release of door hold opens connected directly to the FA system

### 3.3 Telecommunications Rooms

- A. The lay-out of the telecommunications rooms as depicted on the drawings shall be utilized as a general guide for bidding purposes. The final room layout shall be carefully coordinated with input from the Owner and from other trades with equipment and/or cabinets to be placed in the room. Final configuration of telecom rooms shall be submitted to Engineer as a coordination drawing with information from all other trades occupying the same room for review prior to permanent mounting of equipment or termination of cabling.

### 3.4 Grounding

- A. The installing contractor shall be responsible for ensuring the grounding integrity of all installed equipment to eliminate the potential for equipment or personnel hazards due to improperly or inadequately grounded systems.
- B. All grounding and bonding shall be in conformance with the National Electric Code, article 250 and as recommended by EIA/TIA-607.
- C. The Division 26 Contractor has provided 120V branch circuitry for use by the PACS system contractor. The branch circuitry is run with a dedicated equipment grounding conductor which shall be utilized by the PACS system equipment. In no case shall the PACS system installation compromise the integrity of the Building Electrical Grounding System.

### 3.5 Programming

- A. It is the Contractor's responsibility to program the system in this section according to the Owner's wishes. Programming may include some of all of the following elements:
  1. Door Groups
  2. Access Groups
  3. Time of Day schedules
  4. Graphical Maps
- B. The contractor shall provide to the Engineer an information request form indicating what information and data fields will be required to be provided by the owner for system programming.
- C. The Contractor shall meet with the Owner and/or Engineer and reach agreement on the programming. This programming agreement shall then be written out in detail and forwarded to the Engineer for approval.
- D. After approval is granted, proceed with final programming. The programming shall include the following at a minimum:
  1. Creation of door access groups. Assigning door access groups to credential holders.
  2. Creation of alarm codes in all buildings for all staff including building and zone privileges for each code.

3. Creation of multiple Time Of Day schedules for all controlled doors, alarm devices and security zones to account for various modes of operation in all buildings.
4. Software interface with CCTV system for camera icons on the Graphical floor plans, TOD operations and alarm modes.
5. Software interface with FA system for release of door hold opens and for release of door locks on fire alarm

### 3.6 Identification/Labeling

- A. Contractor shall identify all major items of equipment and tag all cables with permanent type markers to denote equipment served. Cables shall be tagged at both ends and at each point where the cable is administered.
- B. All labeling and recording shall be approved by the Owner and the Engineer prior to application.

### 3.7 Testing

- A. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all site testing. The Owner will witness all performance verification. Original copies of all data produced during performance verification shall be turned over to the Owner at the conclusion of testing prior to final approval.
- B. The field testing shall demonstrate the following as a minimum:
  1. Proper activation and restriction at all PACS controlled portals/Elevators
  2. Graphical maps fully populated with required and functional interactive icons
  3. System management and reporting modules customized and operational per the Owner's requirements.
  4. Proper activation of all alarm points
  5. Proper activation of all Intercom controlled doors
- C. The Contractor shall deliver a report describing results of functional tests, diagnostics, and calibrations including written certification to the Owner that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. The report shall also include a copy of the approved performance verification test procedure.
- D. Performance Verification Test: The Contractor shall demonstrate that the completed PACS complies with the contract requirements. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The performance verification test, as specified, shall not be started until receipt by the Contractor of written permission from the Owner, based on the Contractor's written report. This shall include certification of successful completion of Contractor Field Testing as specified in paragraph "Contractor's Field Testing," and upon successful completion of training as specified. The Owner may terminate testing at any time when the system fails to perform as specified.

### 3.8 System Start-Up Requirements

- A. The equipment supplier shall provide system integration, set-up and start-up assistance to the Installing Contractor. The proposal shall include complete technical on-site assistance for these activities as required for this system's size and complexity. After completion of the installation, the supplier shall commission the system and request an initial acceptance test by the Owner and Engineer. A final acceptance test shall then be scheduled after correcting any system deficiencies or functionality issues that are determined in the initial test. Provide training, by a system certified trainer, at the project site as coordinated with the Owner and Engineer. The training shall include the following elements:
  - 1. Start-up shall include a complete working demonstration of the PACS.
  - 2. Demonstrate purpose, adjustment, operation and maintenance of the system including each component and control.
  - 3. Review binder containing instructions and equipment and systems data.
  - 4. Technical training sessions, which shall include hands-on training, accompanied by full system documentation and system as-built drawings.
  - 5. Training shall include any documentation and hands-on exercises necessary to enable operations personnel to assume full operating responsibility for the PACS after completion of the training period.
  - 6. Provide a manufacturer's "Certificate of Completion" that is signed, dated and documented for each trainee.
  - 7. The PACS manufacturer shall have available technical support for the Owner.
- B. Division 28 Contractor shall have the total single point of contact responsibility for all aspects of the PACS implementation, including equipment supply, integration, customization, start-up and on-going systems support.
- C. Division 28 Contractor shall employ a service technician to the area that is specially trained and certified to modify and repair the PACS system and who specializes in PACS and Security system integration.

### 3.9 System Acceptance Requirements

- A. The contractor shall demonstrate proper operation of all aspects of the system to the Owner's representative.

### 3.10 Warranty

- A. Warrant all workmanship, equipment, material and software entering into this contract for a period of one (1) year from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Provide a statement of this warranty with the O & M Manuals.
- B. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period. Provide estimated cost of this service contract within the proposal.
- C. Contractor shall be responsible to provide service during normal working hours within (8) hours after notification by the Owner for normal service or within (2) hours for emergency service. Emergency service is defined as the loss of any system component inhibiting access to the system operation, or the loss of the main server.
- D. If equipment cannot be repaired with 24 hours of service visit, the Contractor shall provide "loaner" equipment to the Owner at no charge.



- E. Proper identification is required and must be visible while on-site for warranty/service calls. Provide notification of completion to the Owner prior to departing the site.

### 3.11 O&M Manuals

- A. Copies of all approved shop drawings with the Engineer's stamp.
- B. Owner's manuals for every item of equipment when available from the manufacturer. These shall be the technical manuals provided by the manufacturer and shall not consist of generic sales brochures. Technical manuals shall provide complete specifications for the equipment as well as complete operating, maintenance, troubleshooting and product repair/replacement information. Where available only in electronic format, the contractor may provide a CD with electronic versions of Owner's manuals. CDs containing electronic versions of Owner's manuals must contain the proper software viewers for each document type.
- C. Technology drawings updated with final as-Built information. This shall be in the form of a complete set of Technology drawings with as-built information indicated in colored pen based upon actual field conditions.
- D. System schematic and block diagrams for every system updated with final as-built information. These drawings shall define the exact arrangement of each system including wiring configuration, device locations and cable types.
- E. Rack elevations for all systems with rack mounted equipment.
- F. Warranty: Provide statement of warranty with O&M manuals.

END OF SECTION



**28 23 01 VIDEO SURVEILLANCE - IP**

**PART 1 - GENERAL**

1.1 General

- A. These specifications shall be utilized for the complete system as specified herein and as shown on the bid documents.

1.2 Scope of Work

- A. These Specifications contained herein describe specific functional requirements of the CCTV system. It is not the intent of these specifications to detail and describe the exact performance of the system. The system features outlined in the Specifications are deemed mandatory for the project. References to model numbers are intended only for descriptive purposes. Systems that deviate from these Performance Specifications shall be considered alternate systems.
- B. Expansion of existing Milestone VMS with AXIS cameras.
- C. Interior Camera System - System consists of multiple IP based cameras with specified housings, mounting, lenses, features, etc. throughout the building interior as indicated on the drawings and as specified herein.
- D. Video Management – Expand existing Milestone VMS Equipment and software to process video from all new cameras and provide control/distribution as required for storage, archive, preview, and live monitoring of all video files and streams.
- E. Network Camera Cabling
  - 1. Data/Video Provided under section 27 15 13
- F. Software Support – Project to include a minimum 1year software support which will include complete software/license upgrades within the timeframe of the support and 24/7 tech support.

1.3 Quality Assurance

- A. All system components shall be UL listed.
- B. Installation shall be in compliance with the National Electric Code and all other applicable codes. The system shall be in compliance withal FCC Rules and Regulations.
- C. All equipment described herein shall be the product of a manufacturer of established reputation and experience, who shall have produced similar equipment for a period of at least 2 years and who shall be able to refer to similar installations within a 75 mile radius now rendering satisfactory service.
- D. The manufacturer and their local agent shall show satisfactory evidence upon request that they maintain a fully equipped service center capable of furnishing adequate inspection and service to the equipment including standard replacement parts. The manufacturer and /or agent shall be prepared to offer a service contract for the maintenance of the system after the warranty period.

- E. To establish continuity in the manufacturer, like systems components (e.g. all cameras) shall be the standard product of one manufacturer. The manufacturer will have a minimum of two (2) years' experience in the manufacture of products specified.
- F. All materials furnished under this contract shall be new, of highest quality and shall be of a regularly manufactured line, currently in production at the time of installation.
- G. All material furnished under this contract shall meet or exceed minimum performance and operational requirements as established by the system vendors for the configurations being implemented for this project.

#### 1.4 Contractor Qualifications

- A. The Closed Circuit Television System shall be furnished, installed and programmed by a contractor who meets all the requirements listed herein. It shall not be acceptable for the CCTV contractor to utilize a sub-contractor for any portion of the work, unless the sub-contractor has been approved in writing by the Engineer based upon adherence to the qualifications listed herein.
- B. The Contractor shall maintain a fully equipped, factory certified service organization capable of providing full maintenance and service of the installed system within 24 hours. This facility shall be available for inspection by the Engineer.
- C. The Contractor shall employ factory trained service personnel for the service and maintenance of the system.
- D. The Contractor shall have had a minimum of 1 year experience with the specified CCTV system. This experience shall include having completed a minimum of 2 installations in the past 12 months of similar size and scope. The Contractor shall provide references and contact information for the project sites in which the qualifying installations occurred.

#### 1.5 Shop Drawings - Submit shop drawings including product data sheets and wiring diagrams per requirements in the General Conditions including the following:

- A. A complete list of materials with model and part numbers and references to the Part 2 specification paragraph numbers.
- B. Manufacturers Data Sheets of all products and cabling, specific to the project. Data sheets shall show the exact parts, with model numbers and options as required and clearly identified.
- C. Qualifications
  - 1. A statement of contractor's qualifications to verify compliance with other provisions within the specifications, unless the contractor has been pre-approved.
- D. Job specific wiring diagrams.
  - 1. This indicates a block diagram that shows all major items of equipment required for the contract project and the actual interconnection that will be installed.
- E. 30x42 floor plans at a scale of not less than 1/8 inch = 1 foot-0 inches showing the location of all items of equipment. Drawings shall also indicate each location where electrical power is

required, and the specific configuration of that power connection (voltage, plug type, mounting height, etc.)

- F. Software data – The data package shall consist of manufacturer's data sheets of all system and application software being provided with sufficient information to verify that all specified features and functions are being addressed.
- G. Submittals that do not contain all the required information will be REJECTED unless prior approval for partial submittals has been approved.

## **PART 2 - PRODUCTS**

### 2.1 Product Equivalency

- A. Where products are listed with multiple manufacturers, these manufacturers will be approved as equals if all specified features are provided. Any equipment not specifically approved in writing prior to the bid date will not be considered regardless of qualifications. Failure to provide the "precise functional equivalent" shall result in the removal of the alternate equipment at the Contractor's expense.
- B. Different manufacturers may require various options, accessories, converters, patch cables, etc. to perform the specified features and functions. Therefore, all material and/or equipment necessary for proper operation of the system shall be deemed part of these specifications.
- C. This specification is intended to establish a carefully planned minimum level of quality and performance for all components, and will be rigorously enforced by Owner. Acceptable manufacturers of components described herein are listed within the specific product section.

### 2.2 Cameras

- A. The following sub-paragraphs define the basic camera/lens/housing types and minimum performance specifications that must be met by the selected products. The contract documents indicate which of these features/functions/housings/etc. must be included with each specific camera.
- B. IP based, IPv6 compliant, Cameras shall be Open Network Video Interface Forum (ONVIF) compliant:
  - 1. Profile S – For streaming video, Streaming and Configuration
  - 2. Profile C - For IP-based basic access control, Site information and configuration, Event and alarm management, , Door access control.
  - 3. Profile G - For edge storage and retrieval, Configure, request and control recording, Receive audio and metadata stream.
  - 4. Profile Q - For quick installation, Easy setup, Discovery, configuration and control of conformant devices
  - 5. Profile A -For broader access control configuration, Granting/revoking credentials, Creating schedules, Assigning access rules.
  - 6. Profile T -For advanced video streaming, H.264 / H.265 video compression, Imaging settings, Motion alarm and tampering events.
- C. Camera shall have removable media storage provisions comprised of purpose built minimum micro SDHC/SDXC cards slots that have been optimized for 24/7 video storage and retrieval with ext4 file system, 20MBs read/write speed, up to 128GB capacity.
  - 1. Provide each camera with a 128GB card.

- D. Environment
  - 1. Interior Domes – Housings shall be heavy duty and shall utilize smoked polycarbonate domes. Unless otherwise noted, all interior cameras shall be unitized domes.
- E. Mounting
  - 1. Recessed – Ceiling. Unit shall mount recessed in an accessible ceiling via the use of ceiling grid support hardware or shall be recessed directly into a fixed ceiling system with appropriate hardware.
- F. Imager/Resolution (refer to camera schedule for specific minimum resolution requirements for each camera)
- G. Lens
  - 1. Refer to drawings for specific lens requirements for each camera.
  - 2. Vari-focal – Lens to be high resolution, Aspherical, multicoated with adjustable zoom, focus and iris. Focal length range as specified on drawings
  - 3. Mega-pixel – Lens to be mega-pixel compatible, hybrid aspherical maintaining image resolution from center to edge, multicoated with adjustable zoom, focus and iris. Lens resolution rating shall be matched to camera resolution.
  - 4. All cameras shall utilize a motorized lens for zoom/auto/back focus.
  - 5. All cameras shall utilize a automatic Iris control for F-stop/depth of field control.
- H. Enhanced Features – Refer to drawings and camera schedule for additional special feature requirements such as Low Light Sensitivity, Wide Dynamic Range, PTZ, and Day/Night.
  - 1. Wide Dynamic Range – Camera to utilize electronic shutter combined with taking multiple images at various shutter settings. The camera shall then re-combine the images utilizing an algorithm to provide enhanced dynamic range via on-board DSP.
  - 2. Low Light – Light Sensitivity 0.1 lux at f1.3 or better.
  - 3. Day/Night – The camera shall utilize a true (not digitally synthesized) low light operation which switches the camera from color to B/W mode by removing the IR cut filter. Low light sensitivity shall be increased in night mode to 0.06lux minimum. D/N feature shall be automatic and not switched manually. Camera to utilize enhanced day/night lens (IR corrected) and imager to prevent focus issues when the IR cut filter is removed. Camera to also utilize automatic back-focus.
  - 4. IR Illuminator – Camera shall include IR LED illuminators. Cameras with integral IR shall utilize an IR “shield” coating to prevent internal reflections of IR on dusty or dirty dome housings.
  - 5. Manufacturer specific dynamic compression.
- I. Connectivity
  - 1. IP Cameras – Camera to utilize integral NIC for 100MBs minimum Ethernet connection.
- J. Power
  - 1. IP - Interior cameras to utilize IEEE 802.3af Power over Ethernet (PoE).
- K. Manufacturers - The following list of manufacturers are considered approved for use provided the individual camera selections conform at a minimum to the above listed specifications – Axis

### 2.3 Video Management System

- A. Provide expansion of the existing Milestone VMS.

### **PART 3 - EXECUTION**

#### **3.1 General Installation**

- A. Install systems in accordance with UL, NEC and all other applicable codes. Install system to comply with drawings and final shop drawings in compliance with manufacturer instructions. Provide all required hardware and labor for rack mounting of head-end system components.
- B. Refer to plans for locations and quantities of equipment. Equipment locations shown on plans will be required to be field coordinated to ensure proper system operation. The contractor shall provide adequate costs in the bid to locate interior cameras within 10 feet in any direction of the location indicated on the bid drawings. Exact location of each camera shall be coordinated with the owner in the field prior to installation. This coordination shall include a site survey with the owner in which the use of a field of view comparator is employed.
- C. No items of equipment shall be installed in such a manner as to void or reduce the proper operating characteristics of individual components or of the system. Camera placement shall be coordinated with glass and exterior exposures to reduce or eliminate the requirement for sever back light compensation.
- D. Perform all work under the on-site supervision of a factory authorized trained technician. It shall be the responsibility of the technician to check, inspect and adjust this installation to the engineer's and owner approval. A CSR of the installing contractor or manufacturer shall train the owner's personnel on the proper operation and maintenance of the equipment. Perform all work in conjunction with this installation in accordance with good engineering practices as established by NEC.
- E. Camera Mounts: The Contractor shall install the camera mounts as specified by the manufacturer and as shown; provide mounting hardware sized appropriately to secure the mount, camera and housing, provide electrical and signal transmission cabling to the mount location as specified.
- F. Cameras: The Contractor shall install the cameras with power and signal lines to the camera; aim camera to give field of view as required by owner.
- G. Delivery of all loose equipment which is to be turned over to owner shall be carefully coordinated and scheduled with owner prior to shipment

#### **3.2 Wiring Installation**

- A. CCTV wiring shall be furnished and installed in accordance with manufacturer's recommendations in compliance with all Local, State and National codes. This contract shall be responsible for furnishing and installing all required cabling between components to form a complete and operational system meeting all the requirements of this specifications.
- B. Provide firestop material and seal all cable penetrations in the building.
- C. All wiring between devices shall be run open wired above accessible ceilings. Where existing cable management systems are in place and there is adequate capacity to install the CCTV wiring, the contractor may utilize these pathways providing they have coordinated with all

other wiring contractor on site. Where multiple runs are required all cables shall be bundled with approved cable ties on four foot centers.

- D. Where pathways do not exist for SMS wiring, this contract shall be responsible for providing all required cable management systems such as J-hooks to support communications cabling to meet building codes and manufacturer's recommendations.
- E. Cables shall not be laid upon ceilings or supported in a manner that would violate any codes or standards.
- F. All cabling installed in ceiling spaces that are used for air distribution plenums shall be UL plenum rated.
- G. All control and signal cable shall be installed continuous and without splices. Provide appropriate connectors or pre-manufactured cables for each application.

### 3.3 Programming

- A. It is the Contractor's responsibility to program the system in this section according to the Owner's wishes. This involves camera labeling, camera operation sequences, camera and recorder schedules, etc. The Contractor shall meet with the Owner and/or Engineer and reach agreement on the programming. This programming agreement shall then be written out in detail and forwarded to the Engineer for approval. After approval is granted, proceed with final programming.
- B. Each building shall have the following minimum programming:
  - 1. Camera labels programmed in each NVS/NVR.
  - 2. Camera record rates based upon TOD schedules, alarm events, motion events.
  - 3. Camera motion detection recording based upon TOD schedules. Motion detection scene masking.
  - 4. Camera username/password changed from the default to owner selected.
- C. Set-up of passwords and a minimum of four (4) user access levels including assignment of specific privileges for each user access level.

### 3.4 Identification/Labeling

- A. Contractor shall identify all major items of equipment and tag all cables with permanent type markers to denote equipment served. Cables shall be tagged at both ends and at each point where the cable is administered.
- B. The contractor shall be responsible for generating and programming the labeling for camera information within the recorder software.
- C. All labeling and recording shall be approved by the Owner and the Engineer prior to application.

### 3.5 Site Testing

- A. General: The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all site testing. The Owner will witness all performance verification.
- B. Contractor's Field Testing: The contractor shall place the entire system into operation and shall field verify that all aspects of the CCTV system including camera video, recording



schedules, alarm events, GUI operation, System administration, etc. At the completion of testing, the contractor shall produce a written document indicating successful system testing.

- C. Performance Verification Test: The Contractor shall demonstrate to the owner that all aspects, features and functions of the completed CCTV system comply with the contract requirements. The performance verification test, as specified, shall not be started until receipt by the Contractor of written permission from the Owner, based on the Contractor's Field Testing sign-off. The Owner may terminate testing at any time when the system fails to perform as specified.

### 3.6 Training Requirements

- A. Provide the owner with a minimum of 24 hours of training designed to make all users familiar with the operation of the system.
  - 1. The Contractor shall conduct training courses for designated personnel in the maintenance and operation of the CCTV system as specified. The training shall be oriented to the specific system being installed under this contract. Training manuals shall be delivered for each trainee with two additional manuals delivered for archiving at the project site. The Contractor is responsible for furnishing all audio-visual equipment and all other training materials and supplies. A training day is Monday through Friday, during normal working hours for the trained staff at the facility. Approval of the planned training schedule shall be obtained from the Owner at least 14 days prior to the training.
  - 2. The course shall be taught at the project site only after successful completion of the Contractor's Performance Verification Testing. No part of the training given during this course will be counted toward completion of the performance verification test. The course shall consist of classroom instruction, hands-on training, instruction on the specific hardware configuration of the installed system, and specific instructions for operating the installed system. The course shall demonstrate system start up, system operation, system shutdown, system recovery after a failure, the specific hardware configuration, and operation of the system and its software. The Contractor shall prepare and insert additional training material in the training manuals when the need for additional material becomes apparent during instruction. The course shall include:
    - a. General CCTV hardware, installed system architecture and configuration.
    - b. Functional operation of the installed system and software.
    - c. Operator commands.
    - d. Fault diagnostics and correction.
    - e. General system maintenance.
    - f. Replacement of failed components and integration of replacement components into the operating CCTV system.
  - 3. Provide all training and utilize specified manuals and record documentation. All training shall be provided at the project site and coordinated with the Owner.
- B. Training shall utilize the equipment provided at the project site. Coordinate use, time and availability of equipment with the Owner.
- C. Demonstrate adjustment, operation and maintenance of the system including each component and control.
- D. This training period shall be scheduled with the Owner after the successful completion of the system.

### 3.7 As Built Documentation

- A. Copies of all approved shop drawings with the Engineer's stamp.

- B. Owner's manuals for every item of equipment when available from the manufacturer. These shall be the technical manuals provided by the manufacturer and shall not consist of generic sales brochures. Technical manuals shall provide complete specifications for the equipment as well as complete operating, maintenance, troubleshooting and product repair/replacement information. Where available only in electronic format, the contractor may provide a CD with electronic versions of Owner's manuals. CDs containing electronic versions of owner's manuals must contain the proper software viewers for each document type.
  - 1. Interior Camera assembly including housing and lens
  - 2. Exterior Camera Assembly including housing and lens.
- C. Technology floor plan/site drawings updated with final as-Built information. This shall be in the form of a complete set of Technology drawings with as-built information indicated in colored pen based upon actual field conditions.
- D. System schematic and block diagrams for every system updated with final as-built information. These drawings shall define the exact arrangement of each system including wiring configuration, device locations and cable types.
- E. Rack elevations for all systems with rack mounted equipment.
- F. Provide statement of warranty.

### 3.8 Warranty

- A. Warrant all workmanship, equipment, material and software entering into this contract for a period of three (3) years from the date of final acceptance or date of beneficial use, as agreed to between Contractor and Engineer. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Provide statement of this warranty with the O&M manuals.
- B. Make available a service contract offering continuing factory authorized service of this system after the initial warranty period.
- C. The Contractor shall be responsible to provide service during normal working hours within (4) hours after notification by the Owner for normal service or within (2) hours for emergency service. Emergency service is defined as the loss of 25 percent or more of system component operation, or the loss of the video switcher or other head-end equipment. Provide an on-site authorized factory technician within 24 hours if required.
- D. If equipment cannot be repaired within 24 hours of service visit, Contractor shall provide "loaner" equipment to the Owner at no charge.

### 3.9 Certification

- A. Upon completion of the testing, the manufacturer or representative shall issue to the Owner a letter of certification attesting to the fact that he has tested and adjusted the system, that all components are properly installed and free of defects, and that the system is in compliance with this specification

END OF SECTION

**28 31 00 FIRE DETECTION AND ALARM - ADDRESSABLE**

**PART 1 - GENERAL**

1.1 Fire Alarm System

- A. The drawings indicate the general arrangement of the work and are to be followed insofar as possible. The word "provide", as used, shall mean "furnish and install". If significant deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Architect for approval before proceeding with the work.
- B. System is an existing Simplex system which is a microprocessor based double supervised, closed circuit fire alarm system of modular design utilizing addressable technology for remote devices. Wiring shall be Class "B" for signaling and notification circuits. Smoke detectors shall be analog, addressable units with control panel adjustable sensitivity. All units of equipment shall be labeled by Underwriters' Laboratories for fire alarm signaling use and shall comply with UL 864 Ninth Edition.
- C. The fire alarm system and installation shall be in compliance with local, city, state, NFPA, ADAAG and IBC Codes.
- D. The system shall also be UL listed for simultaneous supervisory service to provide supervised monitoring of building safety, security and other building alarms as described herein.
- E. Operation of any addressable manual or automatic fire alarm initiating device shall initiate the following:
  - 1. Sound a Code-3 temporal pattern (master coded) audible fire alarm signal and illuminate fire signal lights in a synchronous mode until alarms have been silenced at the main fire alarm system control panel by means of the "alarm silence" switch or the device returned to normal and a "reset" switch is manually actuated.
  - 2. Display alarm condition on integral alphanumeric LCD displays in the control panel(s), and remote annunciator(s), indicating the alarming device and its location. Each manual and automatic alarm initiating device shall be individually addressed.
  - 3. Print the assigned English language message and activate control-by-event functions, with time and date, for the monitored point in alarm at the printer at the control panel.
  - 4. Initiate a separate trouble and alarm signal for connection to the municipal fire department or remote monitoring service organization via leased telephone lines or as directed by the Owner.
  - 5. Transmit a signal over supervised telephone lines to a central station operation for fire alarm trouble and alarm conditions via the fire alarm digital communicator.
- F. In the event of operating power failure or an open or a grounded circuit in the system, a trouble signal and trouble LED shall be activated until the system is restored to normal. The trouble event shall be recorded within the control panel historical trouble log, and printed on the system printer (when applicable). The trouble signal may be silenced by means of a button located on the control panel operator's interface. Upon restoration of the system to normal condition, the trouble indicators shall automatically extinguish.
- G. Supervised Monitoring
  - 1. Operation of the supervisory service of the fire alarm system shall provide for the central monitoring and programmed control of various pieces of equipment and/or systems.

These pieces of equipment shall be interfaced with the fire alarm system via dry contacts and supervised circuitry utilizing individual addressable modules (Monitor IAM) and programmable relay control module (Relay IAM) that are connected to the fire alarm systems data wiring.

2. The fire alarm supplier shall provide individual programming for each monitor point and control point for customized response. As a minimum, programmed response shall include the ability to sound the system trouble alarm at any or all operator control panels and annunciators, display unique alpha-numeric messages, re-initiate a silenced alarm that has not been corrected after a programmed time and initiate a higher alarm status for designated alarms that have not been acknowledged in a programmed time.

## 1.2 Emergency Control Functions and Interfaces

- A. Operation of any addressable manual or automatic fire alarm initiating device shall interface with the components described herein.

### B. HVAC Systems

1. Shut-down air handling unit fans serving that respective fire zone whenever the alarm occurs. Each air handling unit shall have a separate zone with separate signal for this use. The unit zone shall include all smoke detectors and all high limit stats associated with that unit. Provide a set of remote contacts for each air handling unit zone at location as coordinated with the ATC Contractor. Provide control panel mounted H-O-A / "softkey" override switch(es) to permit continuous operation of fan(s) during test of the fire alarm system.
2. Provide signal(s), (output contacts) as described in the sequence of operation. Note that not all initiating devices will activate the smoke evacuation system. One independent auxiliary contact shall be provided for each annunciated zone.
3. Release of smoke dampers when the associated duct mounted smoke detector alarms shall be through the HVAC control system. Provide a 120 volt emergency power supply to a junction box near each group of smoke dampers as indicated on the drawings. Provide a separate remote auxiliary contact (Relay Control Module), associated with each smoke damper duct detector, adjacent to ATC control panels as indicated on the drawings. The Division 23 Contractor shall extend all wiring and conduit from the 120 volt circuit and the fire alarm system remote auxiliary contact as required for operation of the smoke dampers.

### C. Door Controls

1. Release all electro-magnetic door holders.
2. Security Door System Interface
  - a. Provide fire alarm control interface with indicated doors to deactivate door controls (i.e., unlock doors) for a fire alarm condition. Verify programming of each door with fire alarm zones with Engineer prior to installation.
  - b. Refer to drawing for quantity and location of door devices to be interfaced.

## PART 2 - PRODUCTS

- 2.1 Equipment shall be equal in quality and performance to equipment as manufactured by Simplex Grinnell, whose catalog numbers are used herein for establishing equipment criteria. Equipment supplier shall have a service organization within 50 miles of the project site and be a U.L. certified company. All material and/or equipment necessary for proper operation of the system not specified or described herein shall be deemed part of these specifications.

- A. Remote system components as manufactured by Wheelock, Gentex or System Sensor are acceptable if UL listed and warranted as part of the total fire alarm system, provided by the fire alarm equipment supplier.

## 2.2 Remote Fire Alarm System Components

- A. Miniplex transponders will communicate with the Main Fire Alarm Control Panel to provide for centralized control of alarm and trouble signaling as well as output signaling. The transponder shall be capable of limited stand-alone operation in the event the communication link to the central system is lost. Each transponder shall be furnished with all necessary controls, power supplies and battery back-up.
- B. Individual addressable monitor module shall be an addressable module used for monitoring N.O. contact devices such as water flow, tamper switches, the kitchen hood fire extinguishing system, etc. Simplex IAM #4090-9001.
- C. Programmable relay control module shall be an individual addressable module used for control of auxiliary functions such as door release, smoke damper shutdown, air handling unit shutdown, etc. Simplex IAM #4090-9002.
  - 1. Provide a relay control module to disable the sound reinforcement system in rooms as indicated by owner during a F.A. system voice announcement.
- D. Remote Annunciator and Operator Control panels shall be surface wall mounted where shown on plans. Each shall consist of an 80-character LCD display with primary control features similar to the main controller located in the fire alarm control panel. Control buttons are behind a locked window to prevent unauthorized operation. Simplex #4603-9101.
- E. Notification appliance power extender control panels shall be provided where required. These panels shall communicate with and be completely supervised from the main fire alarm panel and shall be capable of powering additional synchronized visual alarm signals and/or audible alarm signal circuits. Each panel shall include supervisory modules, power supplies, batteries and chargers. At the Contractor's option, additional extender panels may be utilized. Coordinate exact locations of these additional remote panels with the Engineer during the submittal phase. Operating power (120V) shall be supplied from the emergency system where available on the premise. Simplex #4009-9201.
- F. Magnetic door holders shall be voltage selectable for 24 VDC or 24/120 VAC operation. Flush (Simplex #2088-9607), semiflush (Simplex #2088-9608) or surface wall mounted (Simplex #2088-9609) as required. Floor mount models for single door (Simplex #2088-9610) or double door (Simplex #2088-9611) applications where required.

## 2.3 Alarm Signal – Initiating Devices

- A. Photo-electric type, addressable, ceiling mounted smoke detectors, shall utilize all solid state components operating on the light scatter principle and shall have adjustable sensitivity set at the transponder to detect smoke at .5 percent to 3.7 percent light obscuration per foot. The sensors shall communicate actual smoke chamber sensitivity to the system control where it is constantly monitored. Each addressable detector is individually adjustable through the control panel and environmentally adjusted. The system will indicate when individual sensors need cleaning. Detector head shall have a white finish, shall contain an integrally mounted LED pilot lamp that indicates detector status. Simplex #4098-9714 with #9792 base. Provide remote LED alarm indicators where indicated.

- B. Photo-electric type, addressable duct mounted smoke detectors, shall utilize all solid state components operating on the light scatter principle and shall have adjustable sensitivity set at the transponder to detect smoke at .5 percent to 3.7 percent light obscuration per foot. The sensors shall communicate actual smoke chamber sensitivity to the system control where it is constantly monitored. Each addressable detector is individually adjustable through the control panel and environmentally adjusted. The system will indicate when individual sensors need cleaning. The detector shall contain an integrally mounted LED pilot lamp that indicates detector status. Simplex #4098 Series housing with #4098-9756 detector.
  - 1. A remote mounted test/reset switch with "status" pilot lamp shall be flush mounted at 54 inch mounting height in a convenient location within sight of air handling unit, Simplex #2098-9806. Provide auxiliary contact/relay in base of units to control smoke dampers, Simplex #4098-9843 PAM Relay.
- C. Ceiling mounted heat detectors shall be addressable, combination rate-of-rise and fixed-temperature type set to alarm at 135 degrees F. or on a temperature rise of 15 degrees F. per minute. Unit shall also be capable of low temperature monitoring. Detector shall be white and low profile style. Simplex #4098-9733 with #4098-9792 base.
- D. Waterflow switches shall indicate the continuous flow of water in sprinkler pipes. Switches shall be furnished and installed by the Fire Suppression Contractor. Wiring and connection shall be by this Electrical Contractor. Unit shall be equipped with retard mechanism, adjustable up to two minutes, to minimize false alarms due to pressure changes. Coordinate pipe size with Fire Suppression Contractor. Units are to be turned over to Fire Suppression Contractor for installation. Each waterflow switch shall be connected to the fire alarm system through a dedicated address via a monitor module. Simplex #2097-9047 thru 9054 depending on pipe size.
- E. Manual Stations shall be addressable communicating devices, shall have a red finish and shall be non-coded, single action with breakrod operation (glass rod not required to reset station), semi-flush with keyed reset switch. Simplex #4099-9001.

#### 2.4 Notification Appliances

- A. Fire signal lights (strobe lights) for synchronized operation shall provide visual indication of all alarms and shall illuminate in a flashing mode whenever system is in alarm state. Fire signal lights shall be labeled in accordance with UL 1971 Standards and shall be 15 candela in corridors and 75 candela in all other areas unless specifically designated as 110 candela on the drawings. Semi-flush mount signal lights on walls where shown on the drawings. Lens shall be installed in a horizontal alignment on a red back plate labeled "FIRE" and shall produce 1 flash per second. Strobes shall be Simplex non-addressable #4906 Truealert Series with appropriate mounting hardware. Exterior units shall be gasketed and labeled for exterior use. Wheelock #WM3T.
- B. Horns shall be semi-flush mounted, with red grille and field selectable output levels of 90 or 95 dB at 10 ft. (based on UL 464 reverberant test requirements). Horn operating power levels shall be set initially at 90 dB and adjusted up or down as required for proper sound coverage during the final check-out. Power calculations shall be made using the current draw for these units operating at 95 dBA. Outside assemblies shall be weatherproof. Combination (audible/visible) horn and fire signal lights shall utilize a compact, combination mounting base assemblies. Horns shall be labeled "Fire". Wheelock #MT Series (utilize the continuous horn signal setting) with mounting accessories. Exterior units shall be gasketed and labeled for exterior use. Combination strobe/horn signal units shall be factory assembled Wheelock #MT+ Series.

- C. Combo horns with fire signal lights (strobe lights) for synchronized operation shall provide both audible and visual indication of all alarms and shall illuminate in a synchronized flashing mode whenever system is in alarm state. Fire signal lights shall be labeled in accordance with UL 1971 Standards and shall be 15 candela in corridors and 75 candela in all other areas unless specifically designated as 75 candela or 110 candela on the drawings. Semi-flush mount signals on walls where shown on the drawings. Lens shall be installed in a horizontal alignment and shall produce 1 flash per second. Horns shall be supplied with a red grille / cover and labeled "FIRE" and shall have field selectable output levels of 90 or 95 dBA at 10 feet (based on UL 464 reverberant test requirements). Horn operating power levels shall be set initially at 90 dB and adjusted up or down as required for proper sound coverage during the final checkout. Power calculations shall be made using the current draw for these units operating at 95 dB. All strobes shall be synchronized throughout the entire building utilizing control circuitry within the main fire alarm panel (and extender panels if used). Exterior units shall be gasketed and labeled for exterior use. Simplex non-addressable #4906 True Alert series.

### PART 3 - EXECUTION

#### 3.1 Submittals

- A. The fire alarm supplier shall submit for approval with shop drawings, floor plans, schematic and point to point wiring diagrams showing all manual and automatic devices, control panels, sounding devices, conduit sizes, number and size of wires, etc. Shop drawings shall include calculations for sizing of signal power supplies, voltage drop calculations for audible and visual signal circuits (including provisions for future devices), speaker amplifiers and standby batteries. Voltage drop calculations will be based on each strobe drawing 110 percent of operating current and each audible device drawing 120 percent of operating current to allow for future devices. Submittal shall include copies of personnel certification as required in PART 3. **SHOP DRAWINGS WILL BE REJECTED UNLESS THE SUBMITTAL INCLUDES ALL THIS REQUIRED INFORMATION.**
- B. The Contractor or his fire alarm supplier/installer shall submit shop drawings, after the Architect's and Engineer's review, to the State Fire Marshal's Office where applicable for their review and approval. Where buildings are not under the jurisdiction of the State Fire Marshal, the shop drawings shall be submitted to the local fire official for review and approval. The fire alarm supplier / installer shall provide sealed documents for submittal to the inspection authority.
- C. At completion of the project, the floor plans and wiring diagrams shall be revised "as built" and included as part of the maintenance manuals. The fire alarm supplier shall also furnish a hard copy printout of each detector's address, operating routines, etc. as part of the as-built drawings. Additionally, the supplier shall include an electronic copy (in a digital media format acceptable to the Owner) of the system's operating program with the as-builts for the Owner's records.

- 3.2 Follow NFPA 72 and manufacturer's instructions regarding mounting, wiring and testing system. Installer(s) shall meet project's respective State and local Municipality requirements for certification and as a minimum, have one installer certified as a NICET Level 2. In addition, the fire alarm system supplier shall have on staff, one NICET Level 3 certified individual and be an U.L. certified company. Coordinate exact voice message(s) with Owner.

- 3.3 Surface mounted fire alarm devices (when specifically permitted) mounted on walls - such as manual stations, bells, horns, chimes, fire signal lights, etc. shall utilize finished backboxes. These backboxes shall be red metal and shall be field punched for conduit entrance and shall not employ

stamped K-O construction. Note that all devices in public or finished areas shall utilize recessed mounted boxes unless noted otherwise.

- 3.4 Coordinate door holder equipment connections with hardware supplier and supply necessary power supply from main control panel. Door holders shall not be maintained by integral control unit back up battery.
- 3.5 Duct mounted smoke detectors shall be located per U.L. and manufacturer's guidelines to permit easy access for maintenance and testing. Provide access panels where required. Assure accessibility to the entire assembly.
- 3.6 Provide protection, such as wire guards, which are listed for the specific use on all fire alarm devices within gyms, locker rooms, multi-purpose rooms and other areas subject to mechanical damage or in areas as directed by the Engineer.
- 3.7 Provide a smoke detector at the location of each fire alarm control panel (main panel, auxiliary control panels and remote annunciators) and extend into the system.
- 3.8 Coordinate locations of any additional remote panels (i.e., transponders, extenders, etc.) with the Engineer during the submittal phase. Provide 120 volt emergency circuit to each remote panel.
- 3.9 Wiring, #14 AWG minimum, shall be installed in accordance with manufacturer's wiring diagrams, recommendations and in compliance with practices set forth by local, state and national fire codes. Color code and tag all wires at all junction points. #18 AWG conductors may be utilized when installed as a multi-conductor cable with an overall protective jacket when approved by manufacturer. All fire alarm system wiring shall comply with NEC Article 760.
  - A. All wiring shall be tagged and labeled to correspond with the final record drawings.
- 3.10 All fire alarm wiring shall be installed in conduit; conduit system shall be independent of all other systems.
- 3.11 The following wiring and conduit shall be included in the fire alarm system work in addition to that indicated above:
  - A. Empty conduit with pullwire from the digital communicator to the main telephone backboard. Telephone wiring from the telephone backboard to the digital communicator is the Contractor's responsibility. Assist in making final connections at the digital communicator and verify transmission to and receipt by the Central Station.
  - B. From fire alarm panel, duct mounted smoke detector, or control relay module to each air handling unit and exhaust fan for shutdown.
  - C. From fire alarm panel or control relay module to each EP switch/control panel in ATC system for closing smoke dampers or smoke removal systems.
  - D. From fire alarm panel to electro-mechanical door holders. Coordinate power supply requirements with hardware supplier.
  - E. Wiring to supervisory monitor and control points such as generator alarm wiring or fire pump alarm wiring.



- F. Provide surge suppressors on all wiring which extends outside the building by either underground or overhead wiring to other buildings or remote device locations. The fire alarm supplier shall provide suppressors that are compatible with their system.

### 3.12 System Testing

- A. Upon completion and before acceptance, system performance shall be demonstrated in the presence of the Architect / Owner and Engineer's Field Representative that all specified functions are accomplished and that response is accomplished from all initiating and indicating devices. Provide step-by-step user instructions with graphics identifying operator controls for normal user operations such as silencing of alarms, resetting of system, locking and unlocking controlled doors, etc. Each normal operation shall be on a separate page and all pages shall be laminated for durability and assembled in a three ring "operators manual". This manual is in addition to shop drawings and maintenance manuals.
- B. System shall be tested by and a certificate of inspection shall be furnished by a qualified manufacturer's representative or equipment vendor; submit report indicating results to the Architect. This testing shall be done with the building HVAC systems in operation and the manufacturer's representative shall field check the dBA readings in accordance with levels established by NFPA 72. During this checkout period, adjust audible device output levels as needed.

### 3.13 Warranty

- A. Warrant all workmanship, equipment, material and software entering into this contract for a period of three (3) years from date of final acceptance or date of beneficial use, as agreed to between Contractor and Architect. Any materials or equipment proving to be defective during the warranty period shall be made good without expense to the Owner. Provide a statement of this warranty with the O & M manuals.
- B. During the warranted operation, provide an annual inspection (for a total of 3). This work is inclusive with the warranty and shall be performed during regular working hours, Monday through Friday, excluding legal holidays, as coordinated with the Owner. Provide an inspection report to the Owner.
- C. Provide service during normal working hours on a normal business day within (4) hours after notification by the Owner for normal service or within (2) hours for emergency service. Emergency service is defined as the loss of 25 percent or more of system components operation or the loss of the head-end equipment which renders the system un-usable. Provide an on-site authorized factory technician within 24 hours if required.
- D. If equipment components cannot be repaired within 24 hours of service visit, provide "loaner" equipment components to the Owner at no charge.

- 3.14 Base bid includes two (2) additional combination audible/visual alarm signals 75 cd, two (2) additional ceiling mounted smoke detectors and one (1) additional duct mounted smoke detectors, complete with installation, power supplies, amplifiers, and fifty (50) feet of conduit with circuitry per device. These additional base bid devices shall also include any related submissions to the AHJ, revised "as-builts", related system programming and revised Owner electronic copy. The audible/visual signals and smoke detection shall be added where designated by the Engineer at the time of final acceptance.

END OF SECTION

